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VOLUME 55

NUMBER 6

Experience with New Posterior Teeth Confirms Research Findings

MYERSON AND SEARS DESIGN AND COMBINATION OF MATERIALS PROVE BENEFICIAL IN FULL RANGE OF CASES

Review

February 1956, Richard L. Myerson reported to the American Academy for Plastic Research in Dentistry his finding of dramatic reduction in wear of plastic teeth when opposed to properly designed porcelain teeth. At a clinic in Boston in November 1956, remarkable success was reported in forty-eight clinical test cases. At the time of this writing, thousands of full dentures have been made with Myerson and Sears porcelain-plastic posterior teeth by the profession-at-large. There can be no doubt that this use has been sufficiently extensive both in quantity and duration to be highly conclusive.

Results

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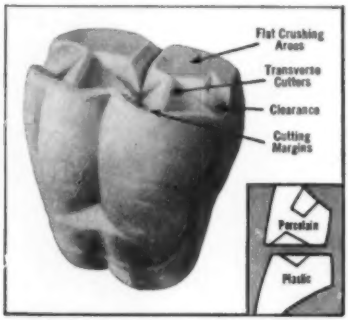

Details of occlusal construction of new Myerson and Sears posterior teeth. Insert drawing shows how upper and lower teeth meet in one plane.

Conclusion

Many benefits can be derived from the use of Myerson and Sears posterior teeth. They are listed below.

I Benefits of Opposing Porcelain Teeth to Plastic

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2. Less shock and resultant trauma and "clicking" than porcelain-to-porcelain.
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II Benefits of the Myerson and Sears Occlusal Design

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2. Increased stability by directing the vertical force of mastication mainly to the lingual side.
3. Increased stability by directing most of the vertical force of mastication to the second bicuspid — first molar region.
4. Increased stability by absence of interdigitating cusps.
5. Easy set-up and articulation.

Whenever the above benefits are desired, the use of these new posterior teeth is indicated.

Available literature includes a booklet describing the new development, a technique by Dr. Victor H. Sears, and mould charts. Inquiries are welcomed. Address: MYERSON TOOTH CORPORATION, 65 Hamilton Street, Cambridge 39, Mass.

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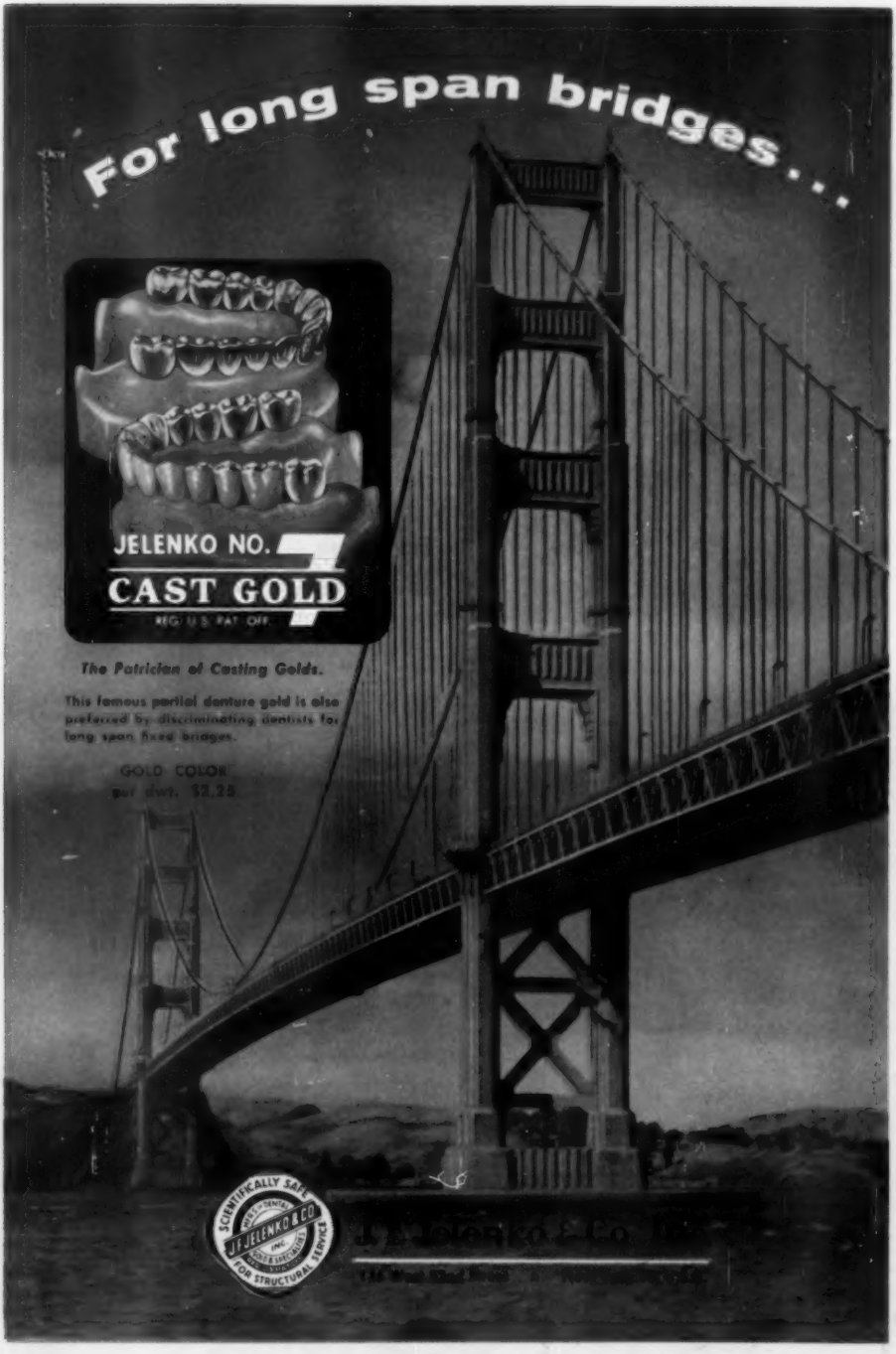
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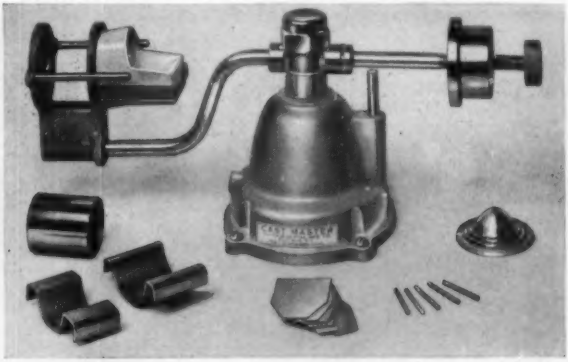

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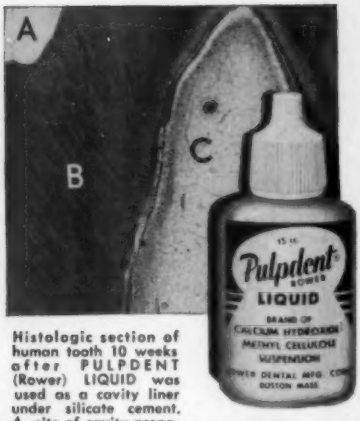

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NO. 12

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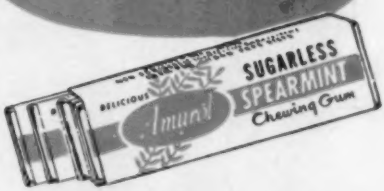

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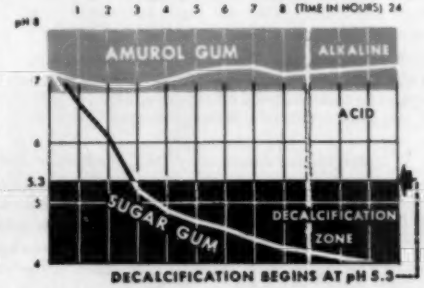

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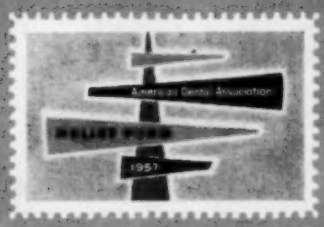

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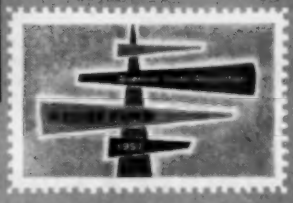

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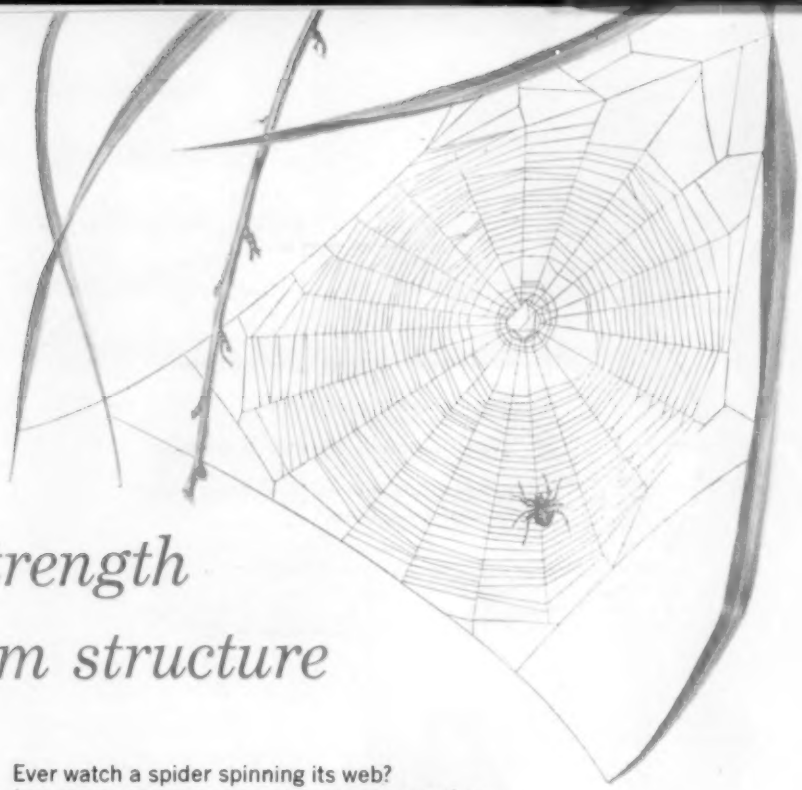

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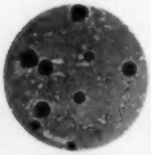

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DECEMBER 1957

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

VOLUME 55 • NUMBER 6

Use of epinephrine with local anesthesia in hypertensive patients I. Blood pressure and pulse rate observations in the waiting room

E. Cheraskin, M.D., D.M.D., and*
T. Prasertsuntarasai,† D.D.S., M.S., Birmingham, Ala.

The question of whether or not epinephrine should be injected with local anesthetic agents for dental procedures in patients with cardiovascular disorders has been a subject of debate for a number of years. So important and controversial is this topic that on December 10, 1953, the Council of the New York Institute of Clinical Oral Pathology addressed the following letter[1] to the New York Heart Association:

> Our Institute is most interested to get an opinion on the use of epinephrine in connection with procaine as a local anesthetic in patients with diseases of the heart and circulatory system. The opinions of heart specialists are so divergent that in the interest of the medical and dental professions this subject should be referred to a special committee for study.

The following is part of a letter, dated October 5, 1954, which was received from the New York Heart Association and which incorporates the report of the special committee:[1]

> This matter has been studied carefully by a committee appointed by the New York Heart Association for that purpose. I believe the enclosed report of this committee is a complete answer to the question which you have raised. This report has been approved by our policy committee for transmission to you.
>
> Please let me know of any further information you may wish to request.
>
> "Your committee submits the following report on the use of epinephrine in connection with procaine as a local anesthetic for dental procedures in patients with diseases of the heart and circulatory system:
>
> "1. It is our understanding of common dental practice that epinephrine is used in dilutions of 1:50,000 and occasionally 1:100,000; never more concentrated than 1:50,000. Rarely more than 2.0 cc. of solution are used in any one session.

*Section on oral medicine, University of Alabama School of Dentistry.

†Section on oral surgery, University of Alabama School of Dentistry.

1. Use of epinephrine in connection with procaine in dental procedures. Report of the special committee of the New York Heart Association, Inc. J.A.D.A. 50:108 Jan. 1955.

"2. Epinephrine is combined with a local anesthetic, commonly procaine. One of the pharmacologic actions of procaine is to counteract the tendency of epinephrine to cause cardiac irregularities.

"3. The dentist should have information from the physician about the nature and severity of the heart disease in the patient. He should also have knowledge of medication the patient is receiving, particularly such medication as might increase the activity of epinephrine. This knowledge is important because ordinary dental procedures may produce emotional stress and cause cardiac disturbance which might be wrongly attributed to epinephrine.

"4. Under these conditions and with these precautions, the use of epinephrine with procaine for dental surgery presents no special hazards in persons with heart disease. We would recommend for any one session that there be used no more than 10.0 cc. of 1:50,000 epinephrine—no more than 0.2 mgm. of epinephrine in any form."

On September 14, 1955, a letter was sent by one of us (E. C.) to Dr. Harold E. B. Pardee, president of the New York Heart Association. The following paragraph is quoted directly from that communication:

We here in the Department of Oral Medicine at the University Medical Center are very much interested in the problem of local anesthesia in hypertensive patients. We are anxious to learn (1) the basis for your statement that no more than 10.0 cc. of a 1:50,000 solution of epinephrine be used, and (2) whether, to your knowledge, anyone has performed a truly experimental project dealing with the use of adrenaline with local anesthesia in hypertensive individuals.

On September 17, 1955, a letter was received from D. F. Milam, medical director of the New York Heart Association, Inc., and Heart Fund, which is quoted here in entirety.

Your Airmail letter of September 14th, I have referred to Dr. Arthur C. de Graff who was Chairman of a committee of the New York Heart Association to make a report on this matter as requested by Dr. Theodore Blum, Secretary of the New York Institute of Clinical Oral Pathology. I am enclosing a copy of Dr. Blum's letter which called for this report by our committee.

Dr. de Graff has asked me to tell you that the committee's report was not made on any experimental studies on the maximum amount of adrenaline to be used in dental anesthesia. The statements were based on the known properties and the pharmacology of adrenaline and that was the basis of the limits set.

Dr. de Graff states that we do not know of any experimental work in this field and that we would be very happy to get any information you know of and can give us.

It should be clear from these communications and a review of the literature that there is a great need to ascertain on an experimental basis whether the administration of epinephrine should be combined with local anesthesia in hypertensive individuals in the usual office procedure. It is evident that this problem is still an open issue. The confusion which exists at the present time justifies this series of reports.

As far as can be determined, there are no reports which analyze the cardiovascular status of the patient while seated in the waiting room and anticipating entry to the doctor's consultation room. This type of information is not presumably available for either the physician's or the dentist's office. Hence, in this first paper, the problem of blood pressure levels and pulse rates obtained in the waiting room will be studied. Subsequent reports will consider the effect of sedation on the blood pressure and pulse rate in the waiting room, the effect of epinephrine with local anesthesia, and the cardiovascular changes which occur during dental surgery.

PHYSIOLOGIC CONSIDERATIONS

In order to appreciate fully the ramifications of this problem, it is necessary to understand the physiology of arterial blood pressure and the pathologic physiology of hypertension.

Physiology of Arterial Blood Pressure • In analyzing the physiology of the arterial blood pressure, it is necessary to differen-

tiate between systolic, diastolic, mean and pulse pressure. The systolic pressure is the peak value obtained during the rapid-ejection period of the cardiac cycle. Diastolic pressure refers to the level in the arterial system just before the aortic valves open to discharge a new load into the vessels.

The average of the systolic and diastolic values is usually taken as the mean pressure. In view of the fact that diastole is generally longer than systole, however, this average is not truly accurate. Nonetheless, for all practical purposes it suffices. The pulse pressure is simply the difference between the systolic and diastolic levels. In the normal individual, the arterial blood pressure averages 120 mm. of mercury, systolic, and 80 mm. of mercury, diastolic. This gives a mean pressure of about 100 mm. of mercury and a pulse pressure of 40 mm. of mercury.

Factors Determining Arterial Blood Pressure • The arterial blood pressure is determined by a combination of five factors: (1) the amount of blood pumped into the arteries, (2) the quantity of blood allowed to leave the arteries, (3) the elasticity of the vessels, (4) the viscosity of the blood and (5) the blood volume. Since the viscosity and the volume of the blood normally remain constant, they need not be considered further in this discussion.

The cardiac output is the quantity of blood ejected by one ventricle during one minute. In other words, it is the determinant of the amount of blood pumped into the arteries. The rate at which the fluid leaves any system is determined by the stopcock. Arterioles possess a heavy, functional, muscular ring. Consequently, these vessels can vary the size of their lumens; thus, they act as stopcocks.

If the stopcock is closed completely, then, as the heart continues to pump blood into the system, the pressure progressively increases until the vessel bursts. On the other hand, if the stopcock is wide open, the blood flows out as fast as it is pumped in and there is little or no pressure. From these two extremes it is evident that the pressure within the arteries is a function of the amount of blood within the system at any one time. This quantity is governed by the cardiac output, on the one hand, and the stopcock, that is, the peripheral resistance, on the other.

It is a basic principle that the pressure in any system reflects the ratio between capacity and volume. It can be seen immediately that the elasticity of the arterial wall must be taken into consideration because, by virtue of this elasticity, the size of the system varies. If the aorta is so elastic that any rise in volume is accompanied by a comparable increase in the size of the vessel, the ratio between capacity and volume is unchanged and so is the pressure. In other words, the greater the elasticity of the aorta and large arteries, the less the pressure will increase during the rapid-ejection phase of the cardiac cycle. Thus, the elasticity of the aorta and large arteries buffers the level of the systolic pressure. During diastole, while the blood is coursing into the arterioles and capillaries, the capacity of the aorta and large arteries also diminishes. True, the decrease in capacity is not so great as the reduction in volume, but the fall in pressure during diastole is not nearly so great as it would be were the vessel walls rigid. To put it another way, the elasticity of these vessels supports the level of the diastolic pressure. In view of these considerations, it can be appreciated why hardening of the arterial vessels results in augmentation of the pulse pressure.

The arterial blood pressure may vary considerably with physiologic factors. Two such variables of significance in this study are the fact that the blood pressure may change with the position of the subject and the fact that hemodynamics is different in the right and left arms.

Currens[2] took the blood pressure of 1,000 subjects (500 men and 500 women) both in the supine position after they had been reclining for three to five minutes and after the subjects had been in the standing position for three minutes. In the upright position, the diastolic pressure was increased more than 4 mm. of mercury in 53 per cent of the men and 44 per cent of the women. A reduction of more than 4 mm. of mercury occurred in 16 per cent of the men and 9.8 per cent of the women. There was no significant change in diastolic pressure in 33 per cent of the men and 46 per cent of the women.

The systolic pressure in the standing position was higher by 10 mm. of mercury or more in 4.2 per cent of the men and 3.2 per cent of the women, and it decreased 10 mm. of mercury or more in 36 per cent of the men and 28.8 per cent of the women. There was no change in systolic pressure in 59 per cent of the men and 68 per cent of the women. The average increase in pulse rate, 13 beats per minute, occurred in the standing position in 96 per cent of the men and 94 per cent of the women. There was no change in the pulse rate in 2.4 per cent of the men and 3.2 per cent of the women, and the pulse rate decreased in 1.6 per cent of the men and 1.8 per cent of the women.

Rueger[3] has shown quite convincingly that the arterial blood pressure is not the same in both arms. A statistical analysis of observations in 755 patients revealed that the readings in the right arm were higher by 10 mm. of mercury or more than those in the left arm in 71 per cent of the patients. For this reason, all blood pressure determinations in this study were made on the left arm.

Pathologic Physiology of Hypertension • According to most conservative authorities, the average systolic and diastolic pressure readings in the adult are 120/80 mm. of mercury.[4] It is the opinion of some leading clinicians[5] that 120/80 mm. of mercury is the usual reading in the 20 to 40 year age group and that 140/90 mm. of mercury is quite within normal limits at the age of 60. Master[6] objects to the arbitrary standards established for the diagnosis of hypertension. He studied the blood pressure in a series of 74,000 presumably healthy men and women between the ages of 16 and 65. He concluded that the upper limits for arterial blood pressure range from 105-135/60-86 mm. of mercury in the 16 year old male and 100-175/60-85 in the 16 year old female to 115-170/70-100 and 115-175/70-100 in the 64 year old man and woman respectively. Since the consensus of most leading authorities is that blood pressure greater than 140/90 mm. of mercury is abnormal, these figures will be used as a guide in this study.

Factors in Hypertension • It has been pointed out that there are two important factors which determine the arterial blood pressure—cardiac output and peripheral resistance. The cardiac output in hypertension is, in an overwhelming number of patients, either normal or slightly subnormal. This means that the basic physiologic cause of hypertension is greatly increased peripheral resistance. Apparently, the arterioles are constricted unduly. The cause of such abnormal constriction has not been ascertained in most patients. In some instances, it may be due to a substance called angiotonin which results from the reaction of renin from a defective kidney and angiotonin precursor, which is produced by the liver.

A few instances have been reported in which a tumor of the adrenal medulla

2. Currens, J. H. Comparison of blood pressure in lying and standing positions: study of 500 men and 500 women. Am. Heart J. 35:646 April 1948.

3. Rueger, M. J. Blood pressure variations in the two arms. Ann. Int. Med. 35:1023 Nov. 1951.

4. Harrison, T. R., and others. Principles of internal medicine, ed. 2. New York, Blakiston Co., 1954.

5. Cecil, R. L., and Loeb, R. F., editors. Textbook of medicine, ed. 9. Philadelphia, W. B. Saunders Co., 1955.

6. Master, A. M. New definitions of normal blood pressure and hypertension. Merck Rep. 63:12 July 1954.

has been responsible for the overproduction of nor-epinephrine and epinephrine, and, finally, there are instances of hyperactivity of the sympathetic nervous system, which causes increased peripheral resistance. This last factor and its relationship to chronic anxiety secondary to life situations and to acute apprehension, such as, before dental procedures, is of particular interest in this study.

METHOD OF INVESTIGATION

This study was made on 160 patients in the department of oral surgery, University of Alabama School of Dentistry. Of this group, 24 of the subjects did not reappear the second day to complete the study. Hence, the complete examinations were made on 136 patients in this investigation. The study included 35 men (20 white and 15 negro) and 101 women (35 white and 66 negro), giving a total of 55 white and 81 negro subjects. The individuals ranged in age from 18 to 74. The average age was 49.1 years.

The data were recorded on a standard form, which is shown in the illustration. The name, age, sex, and color of the patient were recorded. The patient's chart number was also noted so that the clinic record could be obtained for additional pertinent information. Each patient was questioned carefully regarding hypertension, previous hospitalizations and possible allergic reactions.

The procedure established in this study was designed to reproduce, as nearly as possible, the situation which occurs in the average dental office. The only difference was the fact that the various steps in the procedure were controlled as carefully as was possible with human subjects.

In this first portion of the study, attention was focused on the blood pressure and pulse rate of the patient while seated in the waiting room anticipating surgery. The procedure outlined here was carried out on each of the subjects. Immediately after the patient arrived in the waiting room, he was seated in a chair and his blood pressure level and pulse rate were recorded. In order to ascertain how these values compared with his blood pressure and pulse rate under "normal" conditions, he was asked to return the following day so that the blood pressure level and the pulse rate could again be recorded. When 107 of the subjects reappeared the next day, blood pressure level and pulse rate were determined in the sitting position. All of the 136 subjects were allowed to rest on a couch in a quiet and comfortable room for one hour. At the end of the 60 minute period, the subject's blood pressure and pulse rate were again measured.

The importance of measuring the blood pressure in the sitting position the day after surgery was not recognized at the start of the experiment. Consequently, these measurements were not taken in the first 29 patients. This explains the frequent and seemingly paradoxical references to 107 and 136 subjects.

The 24 hour postsurgical recall was designed to obtain the patient's blood pressure level and pulse rate under rest conditions or under those as close to basal conditions as possible. The figures obtained on this second visit were utilized in deciding which patients should be regarded as truly normotensive and which individuals must be considered hypertensive. Seventy patients were classified as normotensive and 66 as hypertensive. Justification for accepting these resting pressure levels as basal is based on the opinions expressed by the American Heart Association. It is held generally that basal pressure signifies the values obtained after rest for 60 minutes in the supine position. It is also held generally that persons with blood pressure levels of less than 138/89 mm. of mercury should be regarded as normotensive and those with levels of 140/90 mm. of mercury or more should be considered hypertensive. These criteria were utilized throughout this experiment.

Name

Date

Group

Chart No. Age Sex Color

History of hypertension

Hospital record

History of allergy

Treatment for hypertension

	Systolic	Diastolic	Pulse rate	Pulse pressure	Mean pressure	Time	Min. after preceding step
Waiting room							
Dental chair (45 min. later)							
Before injection anesthetic agent							
Five min. post-injection							
Ten min. post-injection							
Start of operation							
End of operation							
Sitting next day							
Supine next day							

Nature of operation

Type of premedication

Type of anesthetic agent Amount

Remarks

Standard form

RESULTS

Comparison of Observations Obtained in the Waiting Room and Those Obtained in the Basal State • The patient's initial blood pressure level and pulse rate obtained in the waiting room were compared with those recorded in the basal state (Tables 1-5).

In approximately two thirds of all the subjects, whether normotensive or hypertensive, the systolic pressure level obtained in the waiting room was higher than that recorded while the patient was in the basal state. Three fourths of all normotensive subjects and two thirds of the hypertensive subjects showed a change in diastolic pressure of ±10 mm. of mercury or less when the initial determinations made in the waiting room were compared with those obtained in the supine position the next day.

The mean pressure levels obtained while the patient was in the waiting room

and was in the basal state were approximately the same in one half of the normotensive group, whereas only one third of the determinations in the hypertensive patients showed a change of only ±10 mm. of mercury or less. The remaining 50 per cent of the persons with normal blood pressure and almost two thirds of the hypertensive subjects had a mean pressure level obtained in the waiting room higher than that observed under basal conditions.

Approximately one half of all subjects showed pulse pressure changes of ±10 mm. of mercury or less when the pressure levels obtained in the waiting room and while the patient was in the basal state were compared. Approximately one half of all the patients displayed a pulse pressure in the waiting room higher than that obtained in the basal state.

The pulse rates recorded in the waiting room and in the basal state varied ten beats or less in approximately one half of all the subjects. One third of the normotensive patients and 50 per cent of the hypertensive patients showed a pulse rate in the waiting room higher than that obtained in the basal state.

Table 1 • Difference between systolic pressure taken in the waiting room and basal systolic pressure

Difference in mm. Hg of pressure taken in waiting room as compared with basal pressure	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by:				
51–70	—	—	2	3
31–50	10	14	19	29
11–30	37	53	24	36
Varied by ±10 or less	23	33	14	14
Lower by:				
11–30	—	—	4	6
31–40	—	—	1	2
Totals	70	100	66	100
Greatest reduction in pressure when in basal state, in mm. Hg	46		66	
Greatest increase in pressure when in basal state, in mm. Hg	6		32	
Range in mm. Hg	52		98	

Table 2 • Difference between diastolic pressure taken in the waiting room and basal diastolic pressure

Difference in mm. Hg of pressure taken in waiting room as compared with basal pressure	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by:				
31–40	2	3	—	—
11–30	15	21	19	29
Varied by ±10 or less	53	76	44	67
Lower by 11–20	—	—	3	4
Totals	70	100	66	100
Greatest reduction in pressure when in basal state, in mm. Hg	34		25	
Greatest increase in pressure when in basal state, in mm. Hg	10		15	
Range in mm. Hg	44		40	

Comparison of Observations in the Waiting Room and Control Observations While Sitting • It is clear from Tables 1-5 that there are differences in the systolic, diastolic, pulse and mean pressure levels as well as in the pulse rates between the initial observations in the waiting room and those made the following day after the patient had rested in the supine position for one hour. At first glance, these differences seem simple to explain. It will be recalled that the initial determinations were made immediately after the patient entered the waiting room and was seated. Obviously then, the activity required to reach the waiting room and gravity play a role in determining the patient's cardiovascular status at that moment. In contrast, the basal pressure levels and pulse rates were recorded after the patient had rested in the supine position for 60 minutes. Thus, it would

Table 3 • Difference between mean pressure taken in waiting room and basal mean pressure

Difference in mm. Hg of pressure taken in waiting room as compared with basal pressure	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by:				
31–50	2	3	3	5
11–30	33	47	38	57
Varied by ±10 or less	35	50	22	33
Lower by 11–30	—	—	3	5
Totals	70	100	66	100
Greatest reduction in pressure when in basal state, in mm. Hg	38		45	
Greatest increase in pressure when in basal state, in mm. Hg	10		23	
Range in mm. Hg	48		68	

Table 4 • Difference between pulse pressure taken in waiting room and basal pulse pressure

Difference in mm. Hg of pressure taken in waiting room as compared with basal pressure	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by:				
31–50	2	3	6	9
11–30	29	42	30	46
Varied by ±10 or less	38	54	28	42
Lower by 11–20	1	1	2	3
Totals	70	100	66	100
Greatest reduction in pressure when in basal state, in mm. Hg	34		42	
Greatest increase in pressure when in basal state, in mm. Hg	13		17	
Range in mm. Hg	47		59	

appear that the elements of activity and gravity had been more or less eliminated in the determinations made in the basal state. The problem then becomes one of ascertaining, if at all possible, whether other factors besides activity and gravity have contributed to the observations made in the waiting room.

It should be emphasized that, when all the 136 patients first arrived in the waiting room, they were promptly seated and the blood pressure level and pulse rate were recorded. Actually, when some of them (107) arrived the next day, they were again promptly seated and the blood pressure level and pulse rate were recorded. This was done for two reasons. In the first place, it can be presumed that the amount of activity required to reach the waiting room on both days was approximately the same. Secondly, because of the fact that the initial pressure levels and pulse rates obtained in the waiting room and those obtained the second day were measured in the sitting position, the influence of gravity was essentially the same. After the measurements were made in the sitting position on the second day, the patient was then allowed to rest on a couch and the observations as shown in Tables 1-5 were made.

Therefore, it is of interest to compare the observations made in the waiting room with those obtained under similar conditions the day after surgery was performed. These data are summarized in Tables 6-10. In one half of the normotensive subjects and one third of the hypertensive subjects, the systolic pressure levels obtained in the waiting room and those obtained the next day in the sitting position were essentially the same. Approximately one half of all the patients displayed a systolic pressure in the waiting room higher than that obtained in the sitting position on the second day. In over three fourths of all the patients, the diastolic pressure obtained in the sitting position varied ±10 mm. of mercury or less from that obtained in the waiting room. Almost two thirds of the normotensive and one half of the hypertensive

Table 5 • Difference between pulse rate taken in waiting room and basal pulse rate

Difference in beats/min. of pulse rate taken in waiting room as compared with basal rate	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by 11–30	25	36	33	50
Varied by ±10 or less	42	60	33	50
Lower by 11–20	3	4	—	—
Totals	70	100	66	100
Greatest reduction in rate when in basal state, in beats/min.	24		30	
Greatest increase in rate when in basal state, in beats/min.	20		8	
Range in beats/min.	44		38	

Table 6 • Difference between systolic pressure taken in waiting room and systolic pressure taken next day with patient in a sitting position

Difference in mm. Hg of pressure taken in waiting room as compared with pressure when in sitting position next day	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by:				
51–60	—	—	3	5
31–50	6	13	8	13
11–30	16	35	20	33
Varied by ±10 or less	23	50	22	36
Lower by:				
11–30	1	2	7	12
31–40	—	—	1	1
Totals	46	100	61	100
Greatest reduction in pressure when in sitting position next day, in mm. Hg	42		58	
Greatest increase in pressure when in sitting position next day, in mm. Hg	16		34	
Range in mm. Hg	58		92	

Table 7 • Difference between diastolic pressure taken in waiting room and diastolic pressure taken next day with patient in a sitting position

Difference in mm. Hg of pressure taken in waiting room as compared with pressure when in sitting position next day	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by 11–30	9	20	12	20
Varied by ±10 or less	37	80	46	75
Lower by 11–20	—	—	3	5
Totals	46	100	61	100
Greatest reduction in pressure when in sitting position next day, in mm. Hg	30		30	
Greatest increase in pressure when in sitting position next day, in mm. Hg	10		16	
Range in mm. Hg	40		46	

Table 8 • Difference between mean pressure taken in the waiting room and mean pressure taken next day with patient in a sitting position

Difference in mm. Hg of pressure taken in waiting room as compared with pressure when in sitting position next day	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by:				
31–40	2	4	4	7
11–30	15	33	22	36
Varied by ±10 or less	29	63	31	51
Lower by:				
11–30	—	—	3	5
31–40	—	—	1	1
Totals	46	100	61	100
Greatest reduction in pressure when in sitting position next day, in mm. Hg	35		37	
Greatest increase in pressure when in sitting position next day, in mm. Hg	10		43	
Range in mm. Hg	45		80	

Table 9 • Difference between pulse pressure taken in the waiting room and pulse pressure taken next day with patient in a sitting position

Difference in mm. Hg of pressure taken in waiting room as compared with pressure when in sitting position next day	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by:				
31–50	2	4	4	6
11–30	12	26	21	35
Varied by ±10 or less	31	68	26	43
Lower by 11–30	1	2	10	16
Totals	46	100	61	100
Greatest reduction in pressure when in sitting position next day, in mm. Hg	32		46	
Greatest increase in pressure when in sitting position next day, in mm. Hg	26		28	
Range in mm. Hg	58		74	

group revealed similar mean pressure levels (variation of ±10 mm. of mercury or less) in the waiting room and in the sitting position the next day. Two thirds of the normotensive and less than one half of the hypertensive individuals showed a difference of ±10 mm. of mercury or less between the pulse pressure levels obtained in the waiting room and while in the sitting position the next day. Finally, in approximately three fourths of all the subjects, the pulse rate under these conditions did not vary more than ten beats per minute.

COMMENT

Systolic Pressure • It is clear from these data that the systolic pressure is less stable (more variable) than the diastolic, mean and pulse pressures. Moreover, in a comparison of the pressure levels obtained in the waiting room with the basal pressure levels, the variations (range) of the systolic is found to be much greater than that of the diastolic pressure.

It should be clear that the systolic pressure is higher in the waiting room than it is under basal conditions even when the influence of such factors as physical activity and gravity is eliminated. An attempt made to ascertain other factors will be reported in part 2 of this series of papers.

The systolic pressure obtained in the waiting room exceeds the basal pressure by about 19 mm. of mercury (Table 11). It is abundantly clear that these differences are statistically significant, as is evidenced by P being less than 0.01.

It can be seen from Table 12 that the systolic pressure in the waiting room is even higher than that obtained the next day with the patient in a sitting position. The initial pressure reading was higher by 12 mm. of mercury. Again, P being less than 0.01 indicates the statistical reliability of these observations. In other words, the conclusion can be drawn that

Table 10 • Difference between pulse rate taken in the waiting room and pulse rate taken the next day with patient in a sitting position

Difference in beats/min. of pulse rate taken in waiting room as compared with rate when in sitting position next day	Normotensive patients		Hypertensive patients	
	No.	%	No.	%
Higher by 11–30	5	11	9	15
Varied by ±10 or less	33	72	46	75
Lower by 11–30	8	17	6	10
Totals	46	100	61	100
Greatest reduction in rate when in sitting position next day, in beats/min.	20		26	
Greatest increase in rate when in sitting position next day, in beats/min.	28		20	
Range in beats/min.	48		46	

the patient when seated in the waiting room shows an increase in the systolic pressure over the basal systolic pressure of 12 mm. of mercury that cannot be attributed to physical activity and gravity.

Diastolic Pressure • The evidence shows that the diastolic pressure obtained in the waiting room is also higher than that observed in the basal state, although the increment is about one half of that observed with the systolic pressure. It is also clear that the over-all range of the diastolic pressure is much less than that of the systolic pressure. The statistical significance of the diastolic changes is shown in Tables 13 and 14.

It should be pointed out that, after the influence of activity and gravity is excluded, the increment in the diastolic pressure observed in the waiting room can be regarded as significant in both the normotensive and the hypertensive patients.

Mean Pressure • It is of particular interest that in no patient in the normotensive group was the mean pressure in the waiting room lower than that observed in the sitting position the following day. The over-all mean pressure levels are compared in Tables 15 and 16.

An examination of these tables reveals that the mean pressure in the waiting

Table 11 • Comparison of systolic pressure levels obtained in the waiting room and in the basal state

Blood pressure status	No. of patients	Degree of freedom	Mean systolic pressure in waiting room, mm. Hg	Mean systolic basal pressure, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	70	69	131.6	113.2	18.4	2.8	6.6	<0.01
Hypertension	66	65	177.5	157.6	19.9	3.2	6.2	<0.01

Table 12 • Comparison of systolic pressure levels obtained in the waiting room and control observations obtained while sitting

Blood pressure status	No. of patients	Degree of freedom	Mean diastolic pressure in waiting room, mm. Hg	Mean diastolic pressure while sitting, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	46	45	136.3	123.2	13.1	3.6	3.6	<0.01
Hypertension	61	60	176.1	164.3	11.8	3.5	3.4	<0.01

Table 13 • Comparison of diastolic pressure levels obtained in the waiting room and in the basal state

Blood pressure status	No. of patients	Degree of freedom	Mean diastolic pressure in waiting room, mm. Hg	Mean diastolic basal pressure, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	70	69	79.6	72.1	7.5	1.6	4.7	<0.01
Hypertension	66	65	106.5	99.4	7.1	2.0	3.6	<0.01

room was higher in all instances than that obtained the following day. Eliminating the influence of the factors of physical exertion and gravity, it can be concluded that the patient in the waiting room will display an increase in the mean pressure of about 9 mm. of mercury over the mean pressure level obtained with the patient in the basal state.

Pulse Pressure • Tables 4 and 9 provide the data for comparisons of pulse pressure levels. It can be seen that the variations from normal levels are less when the influence of gravity and physical activity is eliminated (Table 9). Tables 17 and 18 show the statistical significance of pulse pressure changes. In both the normotensive and hypertensive patients, the pulse pressure in the waiting room was higher than that recorded in the basal state. The pulse pressure in the waiting room, after eliminating the influence of physical activity and gravity, is increased by 7 mm. of mercury, which is approximately one half the increment recorded when activity and gravity are allowed to influence the levels. The significance of these comparisons is shown by P being less than 0.02. It can be concluded from these tables that the patient displays a significant increase of pulse pressure in the waiting room of about 7 mm. of mercury.

Table 14 • Comparison of diastolic pressure levels obtained in the waiting room and control observations while sitting

Blood pressure status	No. of patients	Degree of freedom	Mean diastolic pressure in waiting room,mm.Hg	Mean diastolic pressure while sitting, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	46	45	80.8	75.6	5.2	2.3	2.3	<0.01
Hypertension	61	60	106.5	101.4	5.1	2.0	2.6	<0.01

Table 15 • Comparison of mean pressure levels obtained in the waiting room and in the basal state

Blood pressure status	No. of patients	Degree of freedom	Mean mean pressure in waiting room,mm.Hg	Mean mean basal pressure, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	70	69	105.6	92.5	13.1	2.0	6.6	<0.01
Hypertension	66	65	142.0	128.6	13.4	2.3	5.8	<0.01

Table 16 • Comparison of mean pressure levels obtained in the waiting room and control observations while sitting

Blood pressure status	No. of patients	Degree of freedom	Mean mean pressure in waiting room,mm.Hg	Mean mean pressure while sitting, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	46	45	108.6	99.4	9.2	2.7	3.4	<0.01
Hypertension	61	60	141.3	132.6	8.7	2.5	3.5	<0.01

Pulse Rate • In Tables 5 and 10 the pulse rate observations are summarized. Here again it can be seen that there are fewer variations when the influence of physical activity and gravity is excluded. The changes in pulse rate occur, however, in only a small fraction of the subjects. The statistical importance of pulse rate changes is shown in Tables 19 and 20. It can be concluded from these tables that, when the influence of gravity and physical activity is eliminated, the differences in pulse rates become statistically unimportant (P greater than 0.05).

Observations from Histories • It should be recalled that each patient was questioned as to whether he had ever had hypertension. Table 21 compares the patient's statement with his blood pressure status as established under basal conditions. It can be seen from this table that about one third of all patients reported correctly that they had normal blood pressure. In other words, these individuals informed the examiner that they had normal blood pressure and this was confirmed during the experiment. Likewise, slightly more than one third of the subjects reported correctly that they had hypertension. About one out of every four individuals, however, was not aware of his blood pressure status. It can be concluded from these observations that,

Table 17 • Comparison of pulse pressure levels obtained in the waiting room and in the basal state

Blood pressure status	No. of patients	Degree of freedom	Mean pulse pressure in waiting room, mm. Hg	Mean pulse basal pressure, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	70	69	51.9	41.1	10.8	2.2	4.9	<0.01
Hypertension	66	65	71.0	58.4	12.6	2.7	4.7	<0.01

Table 18 • Comparison of pulse pressure levels obtained in the waiting room and control observations while sitting

Blood pressure status	No. of patients	Degree of freedom	Mean pulse pressure in waiting room, mm. Hg	Mean pulse pressure while sitting, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	46	45	55.6	47.6	8.0	2.7	3.0	<0.02
Hypertension	61	60	69.6	62.8	6.8	2.9	2.3	<0.02

Table 19 • Comparison of pulse rate levels obtained in the waiting room and in the basal state

Blood pressure status	No. of patients	Degree of freedom	Mean pulse rate in waiting room, mm. Hg	Mean pulse rate in basal state, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	70	69	82.0	75.3	6.7	1.8	3.7	<0.01
Hypertension	66	65	86.5	76.2	10.3	1.9	5.4	<0.01

Table 20 • Comparison of pulse rate levels obtained in the waiting room and control observations while sitting

Blood pressure status	No. of patients	Degree of freedom	Mean pulse rate in waiting room, mm. Hg	Mean pulse rate while sitting, mm. Hg	Mean difference	Standard error of difference between means	Observed t value	P
Normotension	46	45	80.7	83.1	2.4	2.3	1.0	>0.05
Hypertension	61	60	85.9	85.6	0.3	2.2	0.14	>0.05

if knowledge of the patient's blood pressure status is important to the dental practitioner, it is essential that the dentist measure it himself.

SUMMARY AND CONCLUSIONS

A study of blood pressure and pulse rate was made in 136 patients while they were seated in the waiting room anticipating dental surgery. The observations were compared with those obtained the following day, at which time observations were made with the patient in a sitting position and after he had remained in a supine position for 60 minutes.

The following conclusions can be made:

1. The systolic, diastolic, mean and pulse pressure levels obtained in the waiting room were higher than those obtained with the patient in a basal condition.

Table 21 • Patient's knowledge of blood pressure status

Patient's knowledge	No. of patients	%
Normotension known	48	36
Normotension unknown	22	17
Hypertension known	58	40
Hypertension unknown	8	7

2. The greatest increment was observed in the systolic pressure.

3. The higher levels obtained in the waiting room were not exclusively the result of physical activity and gravity.

4. There was no statistically significant increase in the pulse rate obtained in the waiting room over that recorded with the patient in a basal state.

5. About one out of every four patients was unaware of his blood pressure status.

Thinking, Growing, Living • Let us remind ourselves that though it is the young scientists whose brilliant researches have revealed so much about the physical world (even to the fission of the atom), it is only mature adults who can reveal all the immense and significant potentialities of mankind. At last we are approaching an era in which man lives long enough to have time to think. In thinking he grows, and in growing, lives.—*Anton J. Carlson, Physiological Changes in Aging, 1952.*

Bacteriological study of salivary contamination of the dental contra-angle and handpiece

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The problems associated with the care and maintenance of dental handpieces have become increasingly significant with the use of higher operating speeds.[1,2] With the use of conventional operating speeds and instruments, the sterilization or disinfection phase of handpiece care presents some difficulty due either to residual lubricant from the hot oil baths, or to rust and corrosion from boiling water, steam, or water-soluble disinfectants. These problems apparently have resulted in a haphazard and sometimes ineffectual disinfection program for dental handpieces, or the discontinuation of such procedures altogether.[3,4] In order to plan an adequate and practical sterilization or disinfection program, it was thought desirable to know to what extent the internal parts of the contra-angles and handpieces become contaminated with salivary organisms during routine operating conditions. This study was undertaken to establish some basic data on which a rational program might be founded.

PROCEDURE

All handpieces used in this study were the S. S. White no. 9 Doriot; the contra-angles were Densco UFS, except those listed in Table 3. The instruments were disinfected in DC-550 silicone at 300° F. for 10 to 15 minutes, drained of the excess fluid, reassembled, and put into operation.

Five handpieces were cultured where the cavity preparations were made with the operative field isolated with the rubber dam; the remaining handpieces were used for restorative dentistry without a rubber dam. Whether the handpiece was used without the contra-angle was not determined. After the operation, the assembled handpiece and contra-angle were placed in a sterile towel and cultures obtained from the areas noted in the illustration within two to three hours.

A sterile paper root canal point was inserted into the bur tube of the contra-angle and rotated so as to pick up any organisms present. The paper point was held in sterile forceps and dropped into a flask of glucose ascites medium (brain heart infusion base containing 0.1 per cent agar, 0.2 per cent glucose, and 5 per

This report represents the partial results of studies supported by Contract No. D-185 between the U. S. Public Health Service and the University of Michigan.

Physical Research Laboratory, University of Michigan School of Dentistry.

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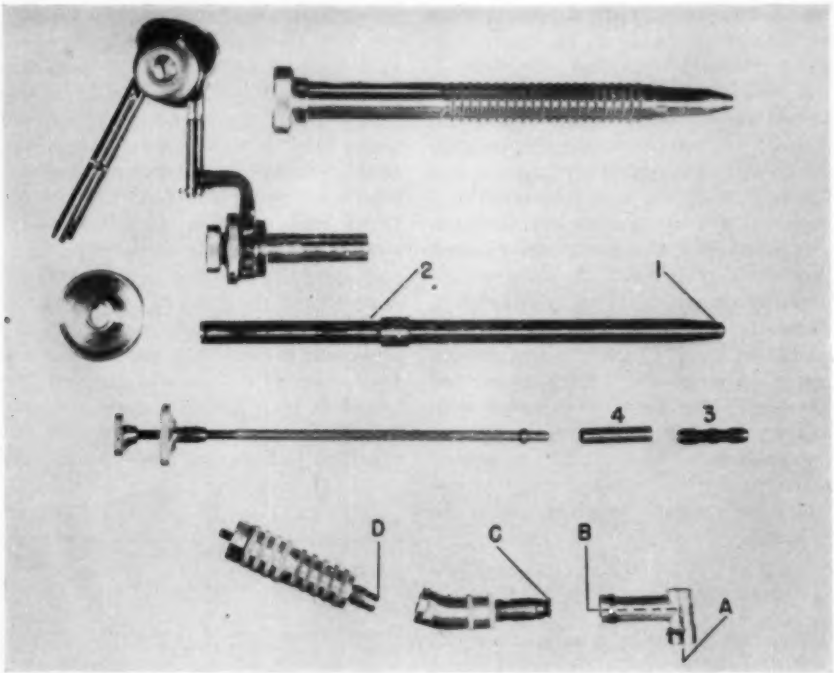
cent ascitic fluid, pH 7.4). The remaining areas of the contra-angle and the upper and lower spindle areas of the handpiece were cultured with sterile swabs by wiping the surface area of the instrument and dropping the swab into a flask of glucose ascites medium; that part of the swab held in the hand was broken off so that this contaminated portion was not inserted into the culture medium. The plunger and chuck were removed by means of a sterile rod and allowed to fall into separate flasks of medium. After remaining in the medium for 15 to 30 minutes, each piece was retracted with sterile forceps.

All the cultures were incubated at 37° C. for seven to ten days. If no apparent growth occurred at the end of this time, transfers were made to glucose agar plates, and these were incubated two to three days. If no growth occurred on the plates, the cultures were assumed to be negative.

Cultures which became cloudy during the incubation period were smeared, gram stained, and examined microscopically. Transfers were made to appropriate mediums for identification of the organisms.

Where salivary organisms were found, they were usually *Streptococci viridans*, either in pure cultures or in combination with other salivary organisms. The contaminations were usually molds and air microorganisms of the spore-former type.



Areas of handpieces and contra-angles from which cultures were obtained. Handpiece: 1, lower spindle; 2, upper spindle; 3, chuck, and 4, plunger. Contra-angle: A, bur tube; B, head gear; C, elbow gear, and D, rear gear

Table 1 • Aerobic cultures

	Handpieces				Contra-angles (taper shank)			
	Lower spindle	Upper spindle	Chuck	Plunger	Bur tube	Head gear	Elbow gear	Rear gear
No. negatives	42 (81%)	46 (92%)	44 (88%)	43 (86%)	32 (64%)	43 (89%)	44 (92%)	45 (96%)
No. contaminated	10 (19%)	4 (8%)	6 (12%)	7 (14%)	11 (22%)	5 (11%)	4 (8%)	2 (4%)
No. salivary organisms	0	0	0	0	7 (14%)	0	0	0
Total	52	50	50	50	50	48	48	47

All cultures of the staphylococci isolated were checked to determine if they were coagulase positive or negative.[5] Since all strains tested were coagulase negative, they were considered to be contaminants.

The first series of tests was made under aerobic conditions. Although salivary organisms were isolated only from the bur tube, contaminants were isolated from all parts of the contra-angle and handpiece cultured. Since these organisms could prevent or interfere with the growth of salivary organisms, a series of cultures was made in the same manner as previously described and placed under anaerobic conditions where there would be less possibility of air organisms overgrowing other microorganisms. The cultures were grown in Brewer anaerobic jars with hydrogen replacing air.

Another series of cultures was taken only from the bur tube and head gear of a group of Midwest and S. S. White latch-type contra-angles which had been used for prophylaxis. These cultures were incubated under aerobic conditions.

FINDINGS

The results shown in Table 1 indicate that the bur tube was contaminated by salivary organisms and air contaminants, whereas all other parts of the contra-angle and handpiece were, to varying degrees, affected only by air contaminants. The greater degree of contamination (all contamination, salivary or other) of the bur tube as compared with other parts is statistically significant and not due to chance, with the possible exception of the lower spindle, where the difference could be due to chance about 6 times in 100. For the bur tube, the distribution of contaminated plates between those contaminated with salivary organisms and those with other organisms is not statistically significant.

The use of anaerobic conditions for growing cultures from the same parts of both handpiece and contra-angle after their use for restorative dentistry resulted in the data shown in Table 2. Salivary organisms were isolated only from the bur tube, whereas other contaminants were isolated from the bur tube, lower spindle, chuck, and plunger, one time for each. Although it might be concluded that this shows a similar trend in terms of percentages as do the data for the aerobic group, the differences here between parts of the handpiece are not statistically significant, undoubtedly because of the small number of cultures.

Both the bur tube and head gear of the latch-type contra-angles used for prophylaxis show much contamination, 48 per cent and 45 per cent respectively, as shown in Table 3. For the tube bur, the

5. Evans, J. B. Studies of staphylococci with special reference to the coagulase-positive types. J.Bact. 55:793 June 1948.

Table 2 • Anaerobic cultures

	Handpieces				Contra-angles (taper shank)			
	Lower spindle	Upper spindle	Chuck	Plunger	Bur tube	Head gear	Elbow gear	Rear gear
No. negatives	12 (92%)	13 (100%)	12 (92%)	12 (92%)	8 (80%)	10 (100%)	10 (100%)	10 (100%)
No. contaminated	1 (8%)	0	1 (8%)	1 (8%)	1 (10%)	0	0	0
No. salivary organisms	0	0	0	0	1 (10%)	0	0	0
Total	13	13	13	13	10	10	10	10

Table 3 • Aerobic cultures—after prophylaxis

	Contra-angle (latch type)	
	Bur tube	Head gear
No. negatives	9 (39%)	11 (55%)
No. contaminated	11 (48%)	9 (45%)
No. salivary organisms	3 (13%)	0
Total	23	20

difference between the number contaminated by salivary organisms (3) and the number contaminated by other organnisms (11) is probably statistically significant.

The stock bottles of two handpiece cleaners and one lubricant which had been opened and used for some time in the laboratory were cultured and found to be negative. These materials could be made sterile intentionally for use with contra-angles and handpieces.

DISCUSSION

From the data presented, it appears that the bur tube of the contra-angles is the only inner surface of the rotating angle instrument which becomes contaminated with salivary organisms. If it is assumed that these organisms are carried in a vehicle of cut tooth debris, water from a spray, or, of course, saliva itself, then the conclusion might be drawn that other inner parts of the instrument beside the bur tube may not need cleaning and sterilization between each patient. To some extent, this may influence a program of routine care of dental handpieces.

No effort was made to prevent exposure to air after disinfection and while operating, because it was thought desirable to follow practical procedures as much as possible.

The greater amount of contamination (both salivary and other) with the use of latch-type contra-angles for prophylaxis may indicate one or a combination of two things. First, the mode of transmission of bacteria may be enhanced due to the type of operation, and second, the design of the contra-angle may facilitate the passage of the bacteria. Since the relatively few cultures were grown only under aerobic conditions, it is possible that even more salivary contamination did occur which was overgrown or hindered in growth by air contaminants.

SUMMARY

This report represents an initial investigation of the contamination of the internal areas of contra-angles and handpieces which occurs during routine operating conditions. Information of this kind is useful for the planning of a rational program for the proper "between patient" care of these instruments. The

data indicate that salivary contamination occurs at the bur tube of the tapered shank contra-angle whereas air contaminants were found in all areas, as shown by the use of aerobic and anaerobic cultures. A greater number of contaminations (salivary and other) of the bur tube and head gear seem to occur with the latch-type contra-angle when used for prophylaxis.

Relative abrasiveness of natural and synthetic toothbrush bristles on cementum and dentin

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In a previous study by one of us (R.S.M.),[1] the abrasive action of synthetic toothbrush bristles on dentin was found to be determined by the type of abrasive used with the brush. Abrasion appeared to be negligible when dentifrice abrasive was absent. Different types of toothbrush bristles were not studied specifically. According to Phillips and Swartz,[2] the thickness or wetness of bristles has no influence on the polishing action of abrasive on tooth enamel. Hence, it seemed unlikely that natural and synthetic bristles would differ in their abrasive action. This question could be answered by a direct comparison of the abrasive action of natural and synthetic bristles, both with and without the use of dentifrice abrasive.

METHOD

The tests were planned to allow natural, hard bristle brushes, hard nylon brushes, and medium nylon brushes to be tested on the same teeth. All brushes were of the three-row, straight-head type, with nylon monofilament (Lactona) brand, using nylon (Tynex). The method used previously[3] was selected because it simulates conditions of toothbrushing used in home oral hygiene. The machine employed moved the brushes through a 7/8 inch stroke at the rate of 180 double strokes per minute, at right angles to the long axis of the tooth. A spring device pressed the brush against the tooth with a force of 75 Gm.

The roots of freshly extracted cuspids and bicuspids were embedded in cylinders of Wood's metal, and each cylinder was mounted on a clamp on the brushing machine. Between experiments the teeth were stored in water to which a crystal of thymol had been added. The area of cementum or dentin exposed to brushing was 1.5 mm. wide. Abrasion was measured from profile shadowgraphs of the teeth magnified 20 times. Shadowgraphs taken before and after the test were

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*Tufts University Dental School.
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2. Phillips, R. W., and Swartz, M. L. Effects of diameter of nylon brushes on enamel surface. J.A.D.A. 47:20 July 1953.
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superimposed, and the maximum change in profile was measured with a scale.

Samples of eight dentifrices—four powders and four pastes—were purchased and tested for their abrasiveness on eight different teeth. One sample of powder (Colgate tooth powder) was selected because its abrasiveness approximated most closely the average abrasiveness of the eight dentifrices. Each tooth was brushed successively with each type of bristle, and the sequence of the test was alternated. The three bristle types were run an equal number of times over the intact surface of the tooth and over the surfaces exposed by the first and second tests, to avoid difficulty because of the layer of cementum on the intact tooth. Each brushing test was carried out for 43,100 double strokes with the one dentifrice chosen.

RESULTS

The result of 96 tests (involving 32 comparisons) showed the mean depth of abrasion for hard natural bristles to be 1.27 ± 0.60 mm. per 100,000 strokes. For hard nylon bristles the abrasion was essentially the same—1.36 ± 0.71 mm. The mean for the medium nylon bristles was somewhat lower (1.22 ± 0.52 mm.). The standard errors indicate that there are no statistical differences between any of the groups.

Little or no abrasion resulted when the brushing was done without abrasive. For this reason, the brushing period was increased to 11 hours and the total number of double strokes to 117,500. Of 96 tests of this type, there was no measurable abrasion for the majority of tests. The mean abrasion for the hard natural brush was 0.005 ± 0.013 mm. per 100,000 strokes. For the hard nylon it was 0.006 ± 0.010 mm., and for the medium nylon bristles the mean was 0.001 ± 0.007 mm. These differences were not significant.

These observations indicate that the abrasive action of toothbrush bristles on human dentin is independent of the usual range of stiffness or composition of bristle; it appears to depend almost entirely on the properties of the dentifrice abrasive that is used in association with the toothbrush.

SUMMARY

The abrasiveness for cementum and dentin was studied for hard natural, hard nylon and medium nylon bristle brushes. The abrasive actions of hard natural and hard nylon bristles were identical, when either dentifrice or water was used on the brush. The medium nylon brush was slightly less abrasive than the two hard bristle brushes in both series of tests, but the differences were not statistically significant. The presence of a tooth powder with medium abrasiveness increased the abrasive action of each brush by several hundred-fold.

Facts and Theories • The best theory is that which necessitates the minimum number of assumptions to unite the maximum number of facts, since such a theory is most likely to possess the power of assimilating new facts from the unknown without damage to its own structure. Our facts must be correct; our theories need not be if they help us to discover new facts, even if these discoveries necessitate some changes in the structure of the theory. *H. Selye.*

The effects of the addition of certain amino acids to enamel decalcifying buffers

Michael G. Buonocore, M.S., D.M.D., and Biruta Sommer, Rochester, N. Y.

In comparing the property of different acids of dissolving powdered enamel, it was found that an aspartic acid-sodium hydroxide pH 4.0 buffer was from 40 to 60 per cent less effective than several other similarly tested acids.[1] Normally, it might be expected that at the same constant pH, buffer solutions of acids of approximately the same anion concentration, not capable of reacting with enamel to form insoluble precipitates, would show only small differences in their dissolving capacity. The result, therefore, obtained at constant pH, suggested that the effect of active acidity, that is, hydrogen ion concentration, may be greatly modified by its associated anion, in this case aspartate ion. Many acids, including the amino acids, have been found in or can gain access to the mouth.[2-9] It is likely, therefore, that since acid decalcification is considered part of the caries process, not one but a mixture of acids is involved. These mixtures probably exist as buffer systems containing hydrogen ion supplied by a variety of acids, including aspartic acid.

In view of the apparently reduced effectiveness of hydrogen ion (acidity) in dissolving enamel in the presence of aspartate ion as compared to other anions at pH 4.0, it was thought worthwhile to investigate the effect of the presence of aspartate ion on the decalcifying action of other acids. In addition to aspartic acid, it was decided to test several other amino acids.

In order to study the effect of the presence of different amino acids on the decalcifying property of other acids which may be present in the mouth, four such acids—acetic, lactic, citric and pyruvic—were selected because they represent a cross section ranging from the very weak (acetic) to the relatively strong organic acids (pyruvic). These acids were first tested as simple buffers, at pH 4.0, for their property of dissolving enamel; they were then retested at the same pH after the addition of one of the following amino

Research associate, Eastman Dental Dispensary.

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9. Shulman, E. H., and Robinson, H. B. G. Salivary citrate content and erosion of the teeth. J.D.Res. 27:541, 1948.

acids: aspartic, glutamic, alanine and valine.

METHODS AND MATERIALS

The method employed to determine the amount of enamel dissolved was one previously used by Buonocore and Bibby.[10] Into weighed Selas filtering crucibles of 6 microns maximum pore diameter, was placed 100 mg. of 80-160 mesh enamel powder prepared by the method of Manly and Hodge.[11] To this was added 20 cc. of the acid buffer, and the contents were agitated by means of a constant speed motor-driven stirring rod for 30 minutes. At the end of this time the contents were filtered by suction and the crucible and stirring rod washed with small portions of distilled water which were added to the filtrate. The crucibles were allowed to dry at 105° C. for one hour and placed in a desiccator until constant weights were obtained. The differences between initial and final weights of the crucibles represented the amounts of enamel dissolved.

Although a microscopic examination of the solid remaining in the crucibles indicated that no precipitates were formed during the decalcification to give misleading weight values, phosphate analyses were made on all filtrates as an additional measure of the amount of decalcification. Phosphate was analyzed according to the method of King,[12] and, at least, duplicate analyses were made in all instances.

To test the effect of the addition of the amino acids on the decalcifying action of the acid buffers, it was necessary to test the dissolving effect of the plain buffer and then to retest the buffer after the addition of the amino acid. To do this best, it was decided to prepare stock solutions at pH 4.0 of both the decalcifying acids and the amino acids at concentrations double those desired for the final test solutions.

Stock solutions of acetic, citric, lactic and pyruvic acids were prepared as simple pH 4.0 buffers of roughly 0.2 molar anion concentration using sodium hydroxide as base. To determine the quantities of acids required to make these solutions, calculations were made using the simple dissociation equation. For citric acid, the K value represented the dissociation constant of the primary hydrogen. In the equations, the hydrogen ion concentration is set at 0.0001 molar, and the anion (A^-) concentration at 0.2 molar. When the equation is solved, the amount of undissociated acid (HA) present under these conditions is obtained. To make the buffer, an amount of acid sufficient to make a 0.2 molar solution plus the quantity (HA) calculated was used, and the solution was then titrated with 5.6 N NaOH using a microburet, to pH 4.0 measured with the glass electrode. Stock solutions of aspartic and glutamic acids were prepared by dissolving, with warming if necessary, enough amino acid to make 0.1 molar solutions and adding base (5.6 N NaOH) until pH 4.0 was reached. With alanine and valine, adjustment of the stock solutions to pH 4.0 was made using a 5 per cent solution of the respective acid with which it was later mixed to make the test solution.

To prepare the test solutions of the plain buffers, one part of the stock was diluted with one part of distilled water. To prepare the mixed buffer, one part of the acid stock was added to one part of the amino acid stock. The final test solutions were all 0.05 molar with respect to the amino acids, and with respect to the other acids as follows: acetic, 0.65 molar; lactic, 0.17 molar; citric, 0.11 molar, and pyruvic, 0.10 molar.

With pyruvic acid, both as plain and mixed buffer, initial tests showed that

10. Buonocore, M. G., and Bibby, B. G. Effects of various ions on enamel solubility. J.D.Res. 24:103 April 1945.

11. Manly, R. S., and Hodge, J. C. Density and refractive index studies of dental hard tissues. J.D.Res. 18:133 April 1939.

12. King, E. J. Micro-analysis in medical biochemistry, ed. 2. New York, Grune & Stratton, Inc., 1951, p. 63.

Table • Comparison of the decalcifying property of different buffers at pH 4.0 with and without the addition of amino acids acting for 30 minutes on 100 mg. of powdered enamel

Test buffers	Acetate buffer			Lactate buffer			Citrate buffer			Pyruvate buffer		
	Final pH	mg. wt. loss	mg. P in filtrate	Final pH	mg. wt. loss	mg. P in filtrate	Final pH	mg. wt. loss	mg. P in filtrate	Final pH	mg. wt. loss	mg. P in filtrate
Plain buffer (P.B.)	4.11	34.0	5.7	4.20	30.6	5.4	4.10	29.1	5.0	4.10	24.6	4.1
P.B. + aspartic acid	4.12	19.2	3.3	4.15	21.1	3.5	4.10	21.4	3.6	4.10	20.5	3.4
P.B. + glutamic acid	4.00	33.4	5.8	4.15	32.3	5.4	4.00	26.8	4.5	4.10	25.3	4.3
P.B. + valine	4.10	35.3	5.8	4.23	30.5	5.1	4.05	23.7	4.0	4.10	23.3	4.0
P.B. + alanine	4.10	36.1	6.1	4.25	29.3	5.0	4.10	24.5	4.2	4.10	24.4	4.1

the buffer would not remain at pH 4.0 during the time it was reacting with the enamel. The pH 4.0 was maintained between 4.0 and 4.1 by the addition of a drop of a diluted solution of pyruvic acid as required. To follow this pH change, the glass electrode assembly was kept immersed in the reaction vessel during the reaction time which was of 30 minutes' duration.

RESULTS

The results obtained are shown in the table which gives the weight loss of enamel in milligrams and the amount of phosphate recovered from the filtrates. The effect of the unmodified simple buffers is shown in the top row. The addition of aspartic acid to each buffer produced a solution less effective in dissolving enamel than the plain buffer. On the basis of phosphate analysis, the effect in acetic acid was most noticeable, with a 42 per cent reduction in amount of enamel dissolved. In lactic and citric acids, it gave a 35.2 per cent and 28 per cent reduction, respectively, but the effect was less noticeable with pyruvic acid, 17.2 per cent. The addition of each of the other amino acids to citric acid seemed generally to produce a medium less destructive to enamel than the plain buffer. The reductions in citric acid were for glutamic, 10 per cent; valine, 20 per cent, and alanine, 16 per cent. Other changes in solubility were not considered significant.

It was thought that perhaps differences in ionic strengths might be responsible for the reduced solubility observed with aspartic acid, since in the mixed buffers the total ionic strength was greater than in the plain buffer because of the presence of the aspartic acid-sodium hydroxide. The effect of buffers containing sodium perchlorate which produces the noncomplexing perchlorate anion in place of the aspartic acid-sodium hydroxide were therefore tested, and amounts were used that were calculated to produce approximately the same ionic strength as in the buffers containing aspartic acid. In addition, solutions in which urea replaced aspartic acid-sodium hydroxide were tested. These solutions dissolved the same amount of enamel as the plain buffers. This suggested that the reductions in enamel solubility were not due to differences in ionic strength but probably were related to the presence of the aspartate ion.

DISCUSSION

The results indicated that the enamel-decalcifying property of certain acids buffered at pH 4.0 is decreased by the presence of aspartate ion. This was confirmed both by weight losses and by differences in the amounts of dissolved phosphorus present in the plain and mixed buffer filtrates. It appeared from the results obtained with the plain and mixed buffers at the same constant pH that the reduced solubility observed was probably due to the presence of the aspartate ion. This ion may have been acting either on the enamel to render it less soluble or on the acids to render them less effective in dissolving enamel. Preliminary evidence, however, indicated that the former was not the case.

Although the reasons for the effect observed with aspartic acid are not understood, the results, nevertheless, allow for some interesting speculation regarding the role of aspartic acid in the mouth. Since the presence of the aspartate ion at pH 4.0 appeared to reduce the decalcifying ability of the individual acids used, it is reasonable to assume that it might similarly affect mixtures of these acids at pH 4.0.

The acids used in the experiments described are likely to be present in the mouth as components of plaque and carious material. If the effect of the aspartate ion when present in these areas is similar to its *in vitro* behavior, it will tend to slow down the rate of tooth dissolution by these acids. If the rate of acid action is thus slowed down, acid neutralizing and removing substances, such as saliva, alkaline foods and water, can then act before much tooth destruction has occurred. Since the results apply only at pH 4.0, however, further work is indicated to determine if the same effect is operative at other pH levels and with different amounts of aspartate ion.

The results obtained with aspartic acid supply a further reason to question the validity of drawing conclusions regarding the potentiality of an acid environment to dissolve tooth structure based solely on measurements of pH without a knowledge of the type of acid or acids involved.

CONCLUSIONS

1. The enamel-decalcifying property of acetic, lactic, citric and pyruvic acid buffers at pH 4.0 can be decreased by the addition of aspartic acid at the same pH level. The reductions were for acetic acid, 42 per cent; for lactic acid, 35.2 per cent; for citric acid, 28 per cent, and for pyruvic acid, 17.2 per cent.

2. The possibility is suggested that the presence of aspartate ion may function to reduce the rate at which the acids in the buffer systems of plaques and carious material dissolve tooth structure.

Progress in Science • Just as every embryo points to a new life, to many new generations, different, frequently better, but sometimes, unfortunately worse than the previous one, so it is with every new scientific contribution. *Selman A. Waksman. My Life with the Microbes.*

Caries-producing factors: a decade of dental research—project no. 3 of the Sugar Research Foundation, Inc.

James H. Shaw, Ph.D., Boston

The information presented in this paper was originally assembled in the form of a terminal report to Dr. Henry B. Hass, president of the Sugar Research Foundation, Inc., which has contributed material support to a fundamental dental research program at the Harvard School of Dental Medicine from July 1, 1944, to December 31, 1954. Since this grant-in-aid was in support of the third project to be inaugurated after the incorporation of the Sugar Research Foundation, it has been known to the Foundation as Project no. 3. This grant-in-aid was discontinued because of a change in emphasis by the Foundation, which necessitated a reduction in the amount of funds available for the support of research.

Obviously, the references listed in a report of this nature are never intended to represent a thorough review of the literature, but they include only those items which have been published from this laboratory in connection with the various investigations sponsored by the grant-in-aid.

Project no. 3 of the Sugar Research Foundation, Inc., entitled "Caries-producing Factors," terminated on December 31, 1954, after being conducted for ten and a half years without interruption. It is of interest to summarize what has been accomplished during that period as a result of the funds made available. Many of the findings indicate that sugar, in particular, and carbohydrates, in general, are primary factors in the causation of tooth decay. Other observations, however, suggest that nutritional and oral environmental means can be instituted to combat the cariogenicity of the carbohydrates, without restriction in the total amounts consumed. This detrimental aspect of sugars and carbohydrates, coupled with the possible means to counteract this influence, could readily be interpreted as areas in which the carbohydrate industries in general have a responsibility to the public to support research that would clarify the various issues involved.

The studies began in July, 1944. Prior to this date, there was a long period during which definitive experiments on the etiology of tooth decay with human subjects were infrequent, and such research often faced insurmountable obstacles. In addition, laboratory studies on dental caries were either impossible or inconclusive by reason of a dearth of predictably caries-susceptible animals and of controllable caries bioassay procedures. Obviously, more important than anything else was the development of scientifically suitable experimental subjects and tech-

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nics to use them. The satisfactory accomplishment of these goals would produce a substantial foundation for more detailed objectives.

TWO PHASES OF INVESTIGATION

For these reasons, the emphasis for approximately the first five years of the grant-in-aid was on two highly essential, preliminary phases of investigation that had been too frequently overlooked or intentionally neglected previously in dental research. First, experimental strains of laboratory animals had to be developed that would have a predictable caries susceptibility when maintained under controlled, regimented conditions. Secondly, scientifically acceptable assays had to be designed and tested by which these animals of known caries susceptibility could be subjected to various standardized influences to determine the effect on the expected constitutional rate of initiation and development of carious lesions. To a large extent, both the first and second phases were accomplished successfully during the first five years, with the result that well-tested breeding stock colonies of rodents and assay procedures were available for use in this laboratory. During this period, a little more than 4,000 common laboratory rats and cotton rats were raised and tested for their caries susceptibility.

After these experimental tools became available, what might on the surface appear to be a more highly productive period, in which the offspring of the colonies could be used in these assays to test the influence of various unknowns on dental caries incidence, was begun early in 1950. It was the painstaking winnowing and sifting of the first five years, however, that made possible the results of the second half of the project.

The studies that were conducted during the second period of five and a half years can be divided into four general categories: those (1) on the relation of nutrition to the development of the teeth, (2) on the role of systemic influences in the maintenance of teeth, (3) on the evaluation of the various bacteria-inhibiting materials as potential caries-preventing agents and (4) to characterize the etiology of dental caries. During this second period, approximately 5,000 rodents were produced by the stock colonies for these trials, in addition to those required to replace the breeding stock.

RESULTS OF INVESTIGATION

The main contributions to the knowledge about dental caries that have been made under the auspices of the Sugar Research Foundation grant-in-aid during this decade may be summarized as follows:

1. Caries-susceptible and caries-resistant strains of the common laboratory rat and the cotton rat were developed and are being maintained in the laboratory to serve as sources of subjects for current experiments.[1,2]

2. Suitable dental caries bioassays were developed for the study of the influence of individual foods or individual chemical compounds on the dental caries incidence.[3-8] These bioassays are based either on highly purified diets or on diets composed of natural foodstuffs.

1. Shaw, J. H.; Shaffer, N. M., and Soldan, L. W., Jr. Postnatal development of the molar teeth in the cotton rat. J. D. Res. 29:197 April 1950.

2. Shaw, J. H. Comparison of the variability in dental caries experience within two caries-susceptible strains of albino rats. New York D. J. 20:121 March 1954.

3. Shaw, J. H. Carious lesions in cotton rat molars. I. The role of mechanical factors studied by the extraction of antagonistic molars. J. D. Res. 26:47 Feb. 1947.

4. Shaw, J. H. Nutrition and dental caries. Fed. Proc. 8:536 June 1949.

5. Shaw, J. H. Carious lesions in cotton rat molars. III. Effect of particle size and consistency of purified ration on incidence and type of carious lesions. J. Nutrit. 38:275 July 1949.

6. Shaw, J. H. Carious lesions in cotton rat molars. V. An effect of the type of cage and bedding on the initiation and development of carious lesions. J. D. Res. 28:495 Oct. 1949.

7. Shaw, J. H. Ineffectiveness of certain essential nutrients in prevention of tooth decay in cotton rat molars. Proc. Soc. Exper. Biol. & Med. 70:479 March 1949.

8. Shaw, J. H. Effects of dietary composition on tooth decay in the albino rat. J. Nutrit. 41:13 May 1950.

3. Through the technic of tube feeding, it was demonstrated that the absence of food in the mouth completely prevented tooth decay.[9]

4. When diets were used that were entirely free of carbohydrate or contained small amounts of either sucrose or starch, no carious lesions developed.[10] As the amount of sucrose or starch was increased, however, there were progressive increases in the incidence of tooth decay.[8]

5. The route by which the sucrose was ingested was found to be important.[11] When sucrose was introduced directly into the stomach by tube and the rest of the diet was consumed in the usual fashion, carious lesions were not initiated. When sucrose was consumed in a solution, there was a low incidence of tooth decay, but when the sugar was consumed in granular form, there was an appreciably higher incidence of dental caries.

6. In studies with purified diets, the monosaccharides and the disaccharides were found to cause the greatest degree of tooth decay. Starches and dextrins were less cariogenic. In diets composed of natural foodstuffs with a high concentration of cereal grains and a low dextrose or sucrose content, there was a high rate of initiation and progression of carious lesions. In these diets, when the sugar content was increased further, there were further increases in the incidence of tooth decay.[12] Replacement of sucrose with raw sugar had no influence on the incidence of dental caries, whereas the substitution of spray-dried blackstrap molasses for sucrose caused striking reductions in the incidence of dental caries.[13]

7. The incorporation of various resinous materials, such as a low-molecular weight polyvinyl acetate, a high-molecular weight polyvinyl acetate, chicle or a branched resin (Arochem), into the cariogenic purified diet resulted in major decreases in the incidence of dental caries in experimental rodents.[14] These results were suggestive of a surface-coating phenomenon. A surface-active material (General Electric no. 81248-251 BH) was found to be completely ineffective in the prevention of tooth decay.[15]

8. In one series of postdevelopmental studies, two purified diets with comparable sucrose concentrations caused appreciably different incidences of tooth decay.[16] These data suggested that, even in the posteruptive period when these bioassays of caries activity were conducted, nutritional influences existed that were mediated by the mineral or vitamin components of the diet.

9. The importance of the calcium-phosphorus ratio of the diet during tooth development was demonstrated.[17,18] When diets with a high calcium-low phosphorus ratio were fed, the apatite formed in the enamel and dentin had a high carbonate-phosphate ratio. When a ration with a low calcium-phosphorus ratio was fed, apatite with a lower carbonate-phosphate ratio was produced. The animals with the higher carbonate-phosphate ratio in the apatite of their enamel and dentin had an appreciably higher incidence of tooth decay.

10. Other studies during the developmental period indicated that the ash of a natural diet, as the only source of minerals, resulted in the production of teeth

9. Kite, O. W.; Shaw, J. H., and Sognnaes, R. F. Prevention of experimental tooth decay by tube-feeding. J. Nutrit. 42:89 Sept. 1950.

10. Shaw, J. H. Effect of carbohydrate-free and carbohydrate-low diets on the incidence of dental caries in white rats. J. Nutrit. 53:151 May 1954.

11. Haldi, J., and others. Relative cariogenicity of sucrose when ingested in solid form and in solution by the albino rat. J. Nutrit. 49:295 Feb. 1953.

12. Shaw, J. H., and Gupta, O. P. A comparison of the cariogenicity of cereal diets and purified rations. In preparation.

13. Shaw, J. H., and Stein, R. J. The influence of the replacement of sucrose by raw sugar or blackstrap molasses on experimental dental caries. In preparation.

14. Shaw, J. H. An effect of certain nutritionally inert materials on the incidence of experimental dental caries. J. Nutrit. 54:177 Oct. 1954.

15. Shaw, J. H. Unpublished data.

16. Wynn, W., and others. Difference in caries-producing effects of two purified diets containing the same amount of sugar. J. Nutrit. 50:267 June 1953.

17. Sobel, A. E.; Hanok, A., and Shaw, J. H. Composition of bones and teeth. Relation to caries susceptibility. Abstracts, American Chemical Society, 124th meeting, Chicago, Sept. 6-11, 1953, p. 72C.

18. Sobel, A. E., and Shaw, J. H. Unpublished data.

that were more caries-resistant than teeth developed during the ingestion of a highly purified reagent grade salt mixture as the sole source of minerals.[19] The fluoride concentrations of the natural diet were insufficient to influence the dental caries incidence.[20]

11. Sialoadenectomy caused tremendous increases in dental caries incidence.[21] The surgical removal of individual pairs of salivary glands resulted in graded degrees of dental caries initiation.[22] In descending order of importance with respect to protection against the development of carious lesions were the parotid, the submaxillary, the major sublingual and the extraorbital lacrimal glands. When more than one pair of salivary glands was removed, a significant compensatory hypertrophy occurred in the remaining glands. Fluoride ingestion by sialoadenectomized rats and by rats with their glands intact caused comparable reductions in tooth decay.[23]

12. Penicillin, chlortetracycline, urea and dibasic ammonium carbonate were particularly effective agents in reducing the rate of initiation and development of carious lesions. Streptomycin, chloramphenicol, gramicidin, tyrothricin, subtilin, pantothenol, sodium-N-lauryl sarcosinate, sodium dehydroacetate, dl-glyceric aldehyde and sodium copper chlorophyllin were either slightly inhibitory or completely ineffective.[24-27] Absolutely no correlation was observed between *in vitro* and *in vivo* tests of bacteria-inhibiting properties.

13. The incorporation of ethylenediaminetetraacetic acid into a cariogenic diet did not cause any increased incidence of carious lesions in the occlusal fissures, but it did cause a high incidence of decalcified lesions along the gingival margin. These decalcified lesions were prevented by feeding a low carbohydrate-high fat diet.[28]

14. Various systemic relationships to dental caries have been explored. No difference in the incidence of dental caries was observed between males and females of either the common laboratory rat or the cotton rat, unlike the observations on the Syrian hamster.[29] Orchiectomy of cotton rats and white rats caused reductions in dental caries incidence that were statistically significant. Oophorectomy of cotton rats and white rats caused minor reductions in the incidence of dental caries that were not statistically significant.[30] The influence of one or two full reproductive cycles during the caries assay did not increase the dental caries incidence in white rats.[31] Preliminary studies have been made on dietary regimens that would maintain hypophysectomized rats for sufficient time to permit a dental caries assay to be conducted.[32, 33]

19. Sognnaes, R. F., and Shaw, J. H. Experimental rat caries. IV. Effect of a natural salt mixture on caries-conduciveness of otherwise purified diet. J. Nutrit. 53:195 June 1954.

20. Shaw, J. H., and Sognnaes, R. F. Experimental rat caries. V. Effect of fluorine on caries-conduciveness of purified ration. J. Nutrit. 53:207 June 1954.

21. Shaw, J. H., and Weisberger, D. Carious lesions in cotton rat molars. II. Effect of removal of principal salivary glands. Proc. Soc. Exper. Biol. & Med. 70:103 Jan. 1949.

22. Schwartz, A., and Shaw, J. H. Studies on the effect of selective desalivation on the dental caries incidence of albino rats. J. D. Res. 34:239 April 1955.

23. Shaw, J. H. Effect of fluorides on dental caries in rats after sialoadenectomy. Oral Surg., Oral Med. & Oral Path. 9:1018 Sept. 1956.

24. Shaw, J. H. Ineffectiveness of racemic glyceric aldehyde in the prevention of experimental tooth decay. Proc. Soc. Exper. Biol. & Med. 72:326 Nov. 1949.

25. Shaw, J. H. Studies on the effect of dl-glyceric aldehyde on the dental caries activity in white rats and cotton rats. J. D. Res. 29:23 Feb. 1950.

26. Shaw, J. H. Ineffectiveness of sodium copper chlorophyllin in prevention of experimental dental caries. New York D. J. 16:503 Nov. 1950.

27. Shaw, J. H., and Sweeney, E. A. Comparative studies on the influence of antibiotic substances in dental caries in the white rat and the cotton rat. J.D. Res. 36:349 June 1957.

28. Shaw, J. H., and Gupta, O. P. The relation of a chelating agent to smooth-surface lesions in the white rat. J. Nutrit. 60:311 Nov. 1956.

29. Shaw, J. H., and Sweeney, E. A. Observations on sexual similarity and bilateral distribution in dental caries incidence in albino rats and cotton rats. J. D. Res. 35:286 April 1956.

30. Shaw, J. H. Studies on effect of gonadectomy on dental caries activity in white rats and in cotton rats. J. D. Res. 29:798 Dec. 1950.

31. Shaw, J. H. Effect of reproduction on dental caries activity in white rats. J. D. Res. 29:802 Dec. 1950.

32. Shaw, J. H., and Greep, R. O. Relationships of diet to the duration of survival, body weight and composition of hypophysectomized rats. Endocrinology 44:520 June 1949.

33. Geyer, R. P.; Shaw, J. H., and Greep, R. O. Utilization of radioactive lipides by normal and hypophysectomized rats. Endocrinology 47:108 Aug. 1950.

SUMMARY

Compelling evidence has been compiled from studies on experimental animals that the carbohydrates, in general, and the monosaccharides and the disaccharides, in particular, are responsible for the initiation and progression of carious lesions. The degree of influence is closely dependent on the form in which the carbohydrate is ingested and the rate at which the carbohydrate is cleared from the oral cavity.

These observations do not mean that carbohydrates have to be eliminated from the diet in order to attain reduced dental caries. Strong genetic factors determine the range in which caries susceptibility lies, when a given oral environment is arranged. Nutritional influences during tooth development can lead to teeth of high caries resistance even when the teeth are exposed posteruptively to the same strongly caries-producing environment. Various antibacterial agents can reduce the rate of caries initiation and of progression through oral environmental pathways.

Over the next few years, research of the type conducted in the past decade will possibly define circumstances and reveal technics that can be applied on a population-wide basis. At present, no known public health measure other than fluoridation gives promise of beneficial results, antibacterial tooth paste and so forth notwithstanding.

In conclusion, I would like to express my personal gratitude to the Sugar Research Foundation, Inc., for uninterrupted support during this ten and one half year period and for the complete liberty to pursue and discuss objectives that the persons engaged in the research believed to be most important for effective use of the grant-in-aid. At the same time, I believe that the Sugar Research Foundation, Inc., is withdrawing from a field of research in which the sugar industry and allied carbohydrate industries have a definite responsibility to the public.

The Spirit of Inquiry • The spirit of inquiry is admirable if it is really inquiry and not uncritical novelty worship. It is right that we should examine and consider every new thing that is presented to us, but not necessarily right that we should adopt it. Most new things turn out in the end to be wrong. When presented with a new project for acceptance, we should first ask: "Is it reasonable?" Then, "Is it really new? Has it, or anything like it, been tried before? If so, has it failed, and why? Was the failure due to some inherent defect, or to some circumstances that can now be remedied? If it is reasonable but yet untried, can it be tried without risk? If there is a risk, how can that risk be eliminated or minimised? Are we justified in a full-scale trial, or should we first try a pilot experiment? Can the experiment be done first on ourselves?" *Sir Heneage Ogilvie. Lancet 1:115, 1956.*

Considerations in the prescription of occlusal rehabilitation

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For purposes of clarity, occlusal rehabilitation can be defined as extensive restorative dentistry, particularly in the fields of full coverage, fixed splinting, and partial dentures—either clasped or internal attachment. It may or may not include restoration or increase of vertical dimension (bite raising).

The author believes that occlusal rehabilitation is sometimes prescribed without due consideration of its implications, and the purpose of this article is to clarify the indications and particularly the contraindications for this procedure.

Occlusal rehabilitation involves more than the restoration of dental function. The whole patient in all aspects must be considered. The psychological and physical conditions of the proposed candidate are as important as the oral lesions present. The patient is faced with a time-consuming, expensive and possibly traumatic ordeal, and will react as a whole. In many instances a greater service can be done by recommending against it than by proposing it.

CONTRAINDICATIONS TO OCCLUSAL REHABILITATION

Physical • As part of the diagnosis, a medical history is always taken and, if indicated by the facts evolved or observation of the patient in general, a complete physical examination may be in order. The presence of any debilitating disease such as diabetes, chronic leukemia, or severe cardiac involvement may prevent occlusal rehabilitation unless the physical condition can be controlled during and after dental treatment. Acute conditions which cannot be controlled rule out the procedure altogether. Even in the absence of specific acute or chronic disease, general poor health and lack of resistance might play a large part in the final determination of whether or not occlusal rehabilitation should be prescribed. Old age, with its accompanying lowered resistance and ability of repair, has to be considered. Certainly, traumatic procedures whose success depends on a good bone factor may be ruled out. Conversely, patients under 30, if any increase in vertical dimension is proposed, are not suited for this treatment since the alveolar bone is not dense enough to prevent intrusion of the teeth under stress. These patients should be handled by orthodontic means with, perhaps, some judicious prosthetic help.

Psychological • Since the success of occlusal rehabilitation is dependent largely on the patient's cooperation before, during and after treatment, the ideal solution would be to perform this work only on emotionally stable people. This being impossible, an attempt must be made to weed out those candidates who

are obviously emotionally unable to undergo stress. The psychotic patient is eliminated immediately. The psychoneurotic patients present the greatest problem as they are able to function and are responsible for their own behavior, but in many situations their contact with reality becomes tenuous. This leaves the dentist open to a situation where unreasonable demands may be made of him, or the patient may not allow himself to be satisfied, no matter what efforts are put forth. Since psychoneurotic patients as a group are rather tense, the probability of their having pernicious habits, such as bruxism and clenching, is great.[1] They may reasonably be expected to furnish a considerable part of the dentist's problem.

If the patient is under the care of the psychiatrist or psychoanalyst, treatment should not be initiated until full cooperation with the therapist is instituted. In the case of an obviously emotionally upset patient who is not under psychiatric or analytic care, the operator is justified in not proceeding unless the patient is willing to undergo a consultation with a psychiatrist or analyst.

In order to eliminate as much difficulty as possible in treating psychologically disturbed patients, the operator should spend a good deal of time in the diagnostic phase of treatment, making absolutely clear to the patient the significance of the diagnosis, the proposed treatment, the prognosis, the fee, and the hazards both during and after treatment. Treatment should not be started unless the operator is positive that the patient has grasped and accepted these facts. The mailing to the patient of the diagnosis and proposed treatment, in writing, may also have a good effect.

Lack of deep motivation is another contraindication to occlusal rehabilitation. The patient must express a genuine desire to save his teeth. Social and family pressures alone are not sufficient stimuli to justify this type of work and, if it is attempted, will usually lead to failure because the patient often will not live up to his responsibilities in the posttreatment stage.

In no case should occlusal rehabilitation be undertaken until the patient both understands and accepts the diagnosis. Acceptance of the diagnosis implies an attitude which expresses the patient's feeling that the course of treatment prescribed is just what he needs to maintain his teeth, and that he understands what is to be done and why it is necessary.

Dental Anatomy and Pathology • One of the things to be borne in mind when occlusal rehabilitation is considered is that no pathologic condition can be predicted where there is no clinical or roentgenographic evidence of breakdown.[2] The individual variation in resistance and repair is so great that a malocclusion that would cause severe destruction in one instance will have no apparent deleterious effect in the next.

In instances where abrasion is not present to a degree causing considerable loss of vertical dimension, the dentist may be justified in being conservative in his approach. Conditions of this kind may go on for many years with little or no breakdown.

An unfavorable crown-root ratio and the presence of thin alveolar bone on the buccal surfaces would make the dentist cautious in recommending occlusal rehabilitation. The restoration of the vertical dimension resulting in increased leverage may cause breakdown even if splinting is employed.

In those instances where there are no posterior teeth present, the prognosis is generally less favorable than otherwise.

The presence of unfavorable muscle habits will also tend to cause breakdown.

In no instance should occlusal rehabili-

1. Bronstein, Ben R. Rationale and technique of biochemical occlusal rehabilitation. J. Pros. Den. 4:352 May 1954.
2. Fox, Lewis. Personal communication.

tation be prescribed where a more conservative approach might be expected to yield reasonable results. This treatment is the prescription of last resort—the treatment after all other possibilities have been exhausted.

The presence of a malocclusion is not sufficient reason for occlusal rehabilitation unless it is accompanied by periodontal breakdown, extreme loss of function, or is unesthetic to a degree unacceptable to the patient and dentist.

INDICATIONS FOR OCCLUSAL REHABILITATION

Caries • When extensive caries endangers the pulps of the teeth, and they can no longer be restored by conservative operative therapy, occlusal rehabilitation is indicated. The presence of widespread decalcification, or a great deal of previous dental work resulting in a large degree of crown loss, justifies full coverage. In young patients great caution must be exercised to prevent damage to the large pulps. The vertical dimension must not be increased in patients under 30 years of age by prosthetic procedures, as the bone is usually not dense enough to resist intrusion under the increased occlusal forces.

Malocclusion and Periodontal Breakdown • The loss of posterior teeth often leads to collapse of the dentition with resultant shifting of the anterior teeth, loss of vertical dimension and periodontal breakdown. Occlusal rehabilitation for these patients may be a justifiable procedure. The restoration of the occlusal level and proper centric relation may restore the mouth to health. In many instances, judicious orthodontic procedures in conjunction with the treatment that has been mentioned previously are found to be helpful.

Temporomandibular Joint Dysfunction • Since occlusal breakdown often leads to temporomandibular joint dysfunction, occlusal rehabilitation may be the treatment of choice.[3] The operator must be reasonably certain that the occlusal breakdown is a contributing factor to the temporomandibular joint dysfunction, and if possible should attempt to relieve this condition by temporary cuspless removable or fixed appliances before committing himself to final restorations. In many instances the restoration of proper centric relation and vertical dimension and the relief of interfering cusps will cause remission of discomfort.[4] If the patient responds to the temporary measures, the operator can proceed with final treatment in relative safety.

Periodontal Breakdown and Splinting • In those instances in which the loss of alveolar bone has proceeded to a point causing mobility of the teeth, extensive splinting in conjunction with judicious periodontal therapy may be quite justified. Therefore occlusal rehabilitation may be recommended to help halt the progress of periodontal disease, provided that no more conservative method of treatment is deemed equally helpful.

Bruxism and Bruxomania • Occasionally there is seen an instance in which the loss of vertical dimension is of such degree that multiple nerve exposures occur. The most effective way to treat this is to restore the correct vertical dimension and centric relation by means of fixed full coverage castings producing a balanced occlusion. Thus, for these instances, occlusal rehabilitation is an acceptable prescription.

Esthetics • Where lack of esthetics of the teeth or facial structures is such that the

3. Miller, Samuel Charles. Oral diagnosis and treatment, ed. 2. Philadelphia, The Blakiston Co., 1946, p. 47, 48.

4. Burket, Lester W. Oral medicine, ed. 2. Philadelphia, J. B. Lippincott Co., 1952, p. 279, 280.

patient's emotional environment becomes unhealthy, and where occlusal rehabilitation can improve the appearance, it may be prescribed.

Inadequate Dental Treatment • The presence of extensive dental work which has been inadequately performed or has outlived its usefulness may make occlusal rehabilitation necessary and justifiable.

SUMMARY

Occlusal rehabilitation is a procedure that must be approached conservatively, and should be recommended only after all other approaches have been ruled out. The whole patient—physically and emotionally—must be considered in recommending treatment.

9 West Prospect

Early correction of anterior cross-bite

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The family physicians of this country, not the specialists, are the men most responsible for the general health of the people. By the same token the family dentist, or general practitioner, and not the specialist in dentistry, is responsible for the dental health of the nation.[1] In the prevention of malocclusion the family dentist usually is the first to see abnormalities developing. It is his obligation to recognize and correct them or to have them corrected by the orthodontist.

There are certain types of malocclusion that can be treated early, and that can be treated by the general dentist. One type that lends itself well to simple treatment is that of correcting lingually locked maxillary anterior teeth. This condition does not always mean that a severe malocclusion is present, but its presence does encourage any tendency toward mandibular protrusion.[2] The prevention of any disease or abnormality requires an understanding of the cause or causes of the condition.

The probable cause of lingually locked maxillary incisors is that the normal eruption of the maxillary permanent incisors is lingual to the deciduous incisors and the prolonged retention of the latter retains the maxillary teeth in a lingual position. The mandibular incisors erupt before the maxillary incisors and the more advanced stage of eruption of the mandibular teeth helps to guide the maxillary permanent incisors into a lingually locked position.

Other causes responsible for locked maxillary anterior teeth may be the under-development of the maxilla and the accidental displacement of the teeth. To recognize this condition at an early age is imperative to the normal development of the child's dentition. The ideal time to correct this condition is just as the maxillary incisors start to erupt. At this stage the root is short and the crown can easily be moved forward through the bone that is still changing. This bone reacts to a very light stimulus, such as that resulting from a small spring or tongue

1. Lamons, F. F. General practitioner's responsibility in the prevention of malocclusion. J.A.D.A. 26:892 June 1939.

2. Gilster, J. E. Method for correction of lingually-locked incisor. J. Missouri D.A. 31:236 July 1951.

blade pressure. Before any work is done, a complete roentgenographic study should be made.

If the lingually locked maxillary incisors are unlocked there is no assurance that a protrusion of the mandibular teeth or a so-called Class III condition will not develop. This condition, however, will not better itself without orthodontic aid.[3] The locking of the anterior teeth prevents normal excursion of the mandible, places abnormal strain on the periodontal tissues of the malopposed teeth with the usual gingival inflammation, resorption of the labial bone of the mandibular teeth and loosening and eventual loss of the lower incisors.

METHODS OF CORRECTION

Dental literature records many methods of correcting lingually locked maxillary incisors. Nothing new, except in materials, has been developed recently in the treatment of this type of malocclusion. In 1803 Fox corrected anterior cross-bites with an appliance which today may look awkward, but it was effective. Today there are various methods used to unlock maxillary anterior teeth, namely:

1. The use of the tongue blade.
2. A maxillary plate which opens the bite and moves the maxillary anterior teeth forward by means of a lingual spring pressure.
3. The use of a crown cemented to one of the maxillary teeth.
4. The use of an acrylic resin splint with an inclined surface ligated or cemented to the anterior mandibular teeth.

These methods have two points in common. They are designed to unlock the lingual teeth, and they cannot do so unless there is sufficient room in the maxillary arch for those teeth to move forward. If the room is insufficient, then corrective orthodontics rather than preventive orthodontics must be instituted.

The acrylic resin splint with an inclined surface is the method which I prefer to use in treating this condition. The acrylic resin appliance is light in weight, easily constructed and simple to remove after it is cemented in place. The material is soft and tends to give and to wear, thus reducing the impact against the teeth and thereby reducing discomfort to the patient. The appliance can be reduced in size easily before or after cementation in the mouth. In constructing the acrylic resin splint the bite is opened just enough to free the lock of the anterior teeth.

CONSTRUCTION OF SPLINT

The procedure for constructing an inclined surface acrylic resin splint is as follows:

1. A full impression is taken of the upper and lower jaws using one of the alginate impression materials. These impressions are poured once in stone and once in plaster. The plaster model is kept for purposes of record.
2. A separating medium is placed on the stone model around the area where the splint is to be constructed and allowed to dry.
3. Using the sprinkle method, acrylic resin is added to the lingual and labial surfaces of the anterior mandibular teeth on the model and allowed to set just enough so that it cannot run. The incisal edge is then built up with an excess of the acrylic material.
4. After the acrylic material has partially set it is placed under water for the final set. It is then removed from the model and trimmed so that the inclined surface extends just far enough lingually to prevent the patient from biting posterior to it and just high enough to unlock

3. Tarpley, B. W. Variations in use of labio-lingual appliance. Am. J. Orthodont. & Oral Surg. 29:208 April 1943.

the bite. The upper model, of course, is used to advantage in this step. In order not to irritate the tissue, the acrylic resin should cover only the teeth. When the proper form and shape has been obtained, the splint should be polished.

5. Since a properly constructed splint tends to snap on and adhere to the teeth, zinc oxide and eugenol rather than crown and bridge cement may be used to bind it to the teeth. It is advantageous to be able to remove the splint easily at intervals for the purpose of checking the relation of the teeth.

COMMENT

Complete movement of the locked teeth is usually accomplished in one or two weeks. When the teeth are unlocked, some type of retention may be required to hold them in place, but in most instances it is not required.

The inclined plane acrylic resin splint is a definite preventive appliance that can and should be used by the general practitioner when indicated if he is to fulfill his obligation to his younger patients.

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Ultrasonic cavity preparation

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The introduction of the ultrasonic dental handpiece marked the beginning of an entirely new era in the field of operative dentistry. By the use of this method, it is possible to prepare cavities in the teeth of human beings for the reception of the various types of filling materials with a minimum of pain and annoyance to the patient, regardless of the age of the subject.

The experience gained at Columbia University School of Dental and Oral Surgery covers approximately two and a half years and includes every type of preparation for which restorations must be constructed. For the benefit of those who are not familiar with this instrument, it consists of a handpiece similar to the rotary handpiece in size and shape through which electrical energy is converted into mechanical energy at the tool tip. The shape of the instrument determines the shape and size of the preparation made in the tooth. Thus it can be seen that it is possible to obtain intricate cavity forms with a minimum of effort, whereas the rotary instrument alone cannot form box or sharp angles. To form the proximal box requires repeated application of the rotary fissure bur and the carrying of the bur from one position to the next until the material is cut away. This roughly shaped box must next be smoothed and polished with chisels and hatchets to form sharp line angles and flat planes.

Inasmuch as the ultrasonic cutting of tooth structure is effected by means of an abrasive mixture, the resultant walls are as smooth as they would be if polished

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Fig. 1 • Diagrammatic view of ultrasonic dental handpiece with section of housing cut away. Method of winding transducer is shown. Water for cooling of transducer is circulated through cable connected to end of handpiece along with wires carrying electric current. Smaller outside tubes are to carry mixture of aluminum oxide and water, and plain water, which is warmed to mouth temperature and controlled by means of thermostat located in power unit

with a corresponding grit on a paper disk. Hand instrumentation is reduced to a minimum and can practically be eliminated, except for excavation of soft caries and the planing of the gingival margin or bevel. All other bevels are obtained by inclining the instrument at the proper angle.

The instrument tip vibrates with a reciprocal motion 29,000 times per second with a stroke amplitude of .0014 inches. There are no lubrication problems as there are no rotating parts to cause wear. A stream of water circulates through the handpiece to cool the transducer (Fig. 1). Because of the fact that a coolant in the form of the abrasive mixture is always present and delivered at the tool tip, there is no desiccation or overheating of the pulp of the tooth. Absence of pressure or metal contact with the tooth guarantees a minimum of trauma to the tooth and pulp.

MATERIALS AND METHODS

Class II cavities in bicuspids or molars are prepared with a boxing tool 3 mm. wide for a bicuspid or 4 mm. wide for a molar. The adjacent tooth is protected by a cloth strip (Fig. 2), rubber dam or metal matrix strip that is secured with a piece of softened compound to prevent slipping out of position.

When ready for operation, the handpiece is adjusted to optimum cutting (setting on the dial), the foot control is advanced to activate the flow of the abrasive mixture, and the tool is held in light contact with the tooth. In a few seconds, the proximal box is cut in the tooth. The instrument is now turned at right angles to the first cut to produce the isthmus which is carried to the proper depth. The retentive portion of the dovetail on the occlusal surface is shaped by returning the tool to the original relation to the tooth in the mesial or distal groove of the bicuspid or the central fossa of the molar. This gives the basic outline of the cavity. Any extension or modification necessary is obtained by cutting further in the desired direction.

Any caries remaining after the outline form is completed is excavated carefully with hand instruments or with a spoon-shaped curet secured in the ultrasonic handpiece and employed as a hand instrument would be, except that a stream of water is run over the instrument tip to prevent heat due to friction. The ultrasonic device cuts hard tooth structure most efficiently, hence enamel is cut most rapidly; hard dentin is cut adequately but the process is slightly slower. Soft carious dentin is cut quite slowly, which means that the danger of accidentally exposing the pulp does not exist to the same degree as when a rapidly revolving bur is used.

Should a cement base be necessary, it is placed now, and after setting is planed smooth with the proper Cavitip. The gingival enamel bevel is done best with hand instruments—posterior margin trimmers. Because the cutting with the ultrasonic instrument is done mostly with a rectangular and flat-sided Cavitip, the resultant cavity has no undercuts; consequently, in gold inlay preparations, the withdrawal of the wax pattern is simplified. Should the choice be an amalgam restoration, the procedure is exactly the same, no bevels being placed on occlusal or proximal surfaces. The axial line angles are produced by the holding

of the boxing tip at an angle to produce the undercut, or a small cylindrical tool is placed in the handpiece and the axial angles cut to the desired extent.

Should it be necessary to extend the cavity to the opposite side of the tooth as in the case of an MOD preparation, the procedure is exactly the same. If it is desirable to restore cusps in metal, the cutting is done with a flat slicing tool turned on its side at the desired angle. Beveling can be done with any tool which the dentist happens to be using.

Should a complete crown be the restoration of choice, further cutting is necessary and, although the ultrasonic method is somewhat slower for gross removal of tooth structure, the safety of the method recommends it to dentist and patient. It is impossible accidentally to cut cheeks, lips or the floor of the mouth. Gingival tissues are injured slightly, if at all, which is not always true when rotating instruments are used.

Class V preparations are easily and quickly made by introducing a flat plane or boxing tool into the gingival area at the proper level and to the proper depth. The resultant cut should be of the optimum depth (Fig. 3,A). Extension is made gingivally and proximally until the desired outline is reached. Beveling, if needed, can be done with the ultrasonic tool or with hand margin trimmers. Undercuts, if desired, as for foil or amalgam, can be made with tools shaped like an inverted cone or wheel bur or with hand instruments.

Class III cavities in anterior teeth are prepared easily. The proximating tooth must be protected by a strip of rubber dam or steel matrix material as with Class II cavities. The instrument used for the preparation of these cavities is bayonet shaped; the end is flat and about 1 mm. wide (Fig. 4,A). With an instrument of this type, it is possible to reach any surface of the anterior teeth to produce the required cut. Undercutting is done with the same tool by changing the angle at which it is introduced into the cavity. Caries remaining after the outline form has been established is removed with either the ultrasonic spoon curet or the hand excavator.

Because of the extreme sensitivity of the anterior teeth, this method of cavity preparation is of great value. It is not necessary to inject a local anesthetic and, after the outline has been established, the rubber dam can be applied and the walls planed with hand instruments.

COMMENT

It can be seen from this discussion of the three major types of cavity preparations

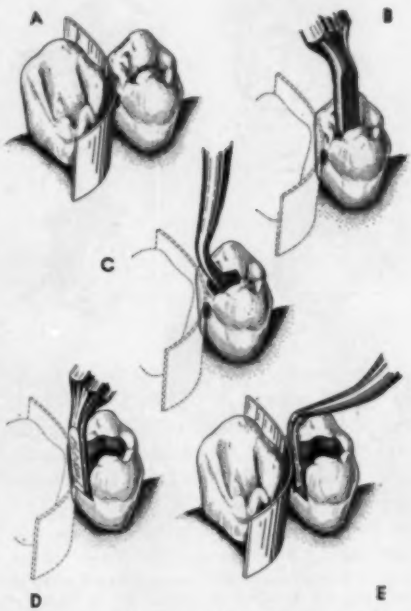

Fig. 2 • A: Proximal surface of adjoining tooth protected by piece of metal matrix material. B: Occlusal portion of cavity is being cut with the boxing Cavitip. C: Caries being excavated from cavity with spoon excavator. D: Proximal box being cut and joined to occlusal portion of cavity previously formed. Note that same instrument is used. E: Cavity preparation is completed by using hand instrument (posterior gingival margin trimmer) to plane gingival wall and create gingival bevel, if desired

that any type of intracoronal cutting is possible with speed comparable to, if not exceeding, that used with any type of rotary or hand instrument. Speed is not the important factor in the therapeutic measures applied; however, it is important that teeth are so treated that the pulp shall suffer the least possible trauma, that the patient shall be spared the annoyance of pain, apprehension and magnified head noises, and that in ultrasonic dental preparation, in the majority of instances, it is not necessary to inject a local anesthetic.

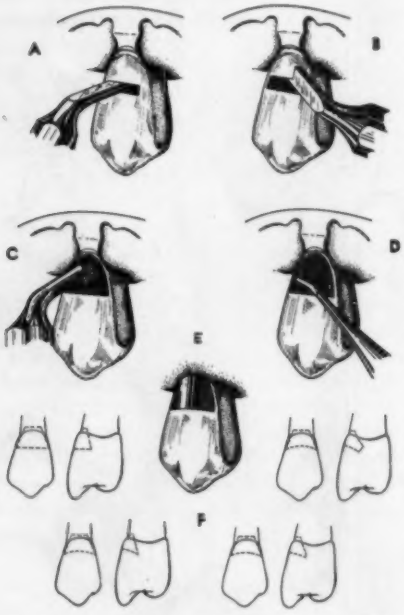

Fig. 3 • A: Boxing tool no. 1 used to establish primary cut in gingival area. Cut is made at level of occlusal margin of cavity. B: Boxing tool turned at right angle and used to make gingival extension of cavity. C: Finishing outline of cavity. Note angulation of instrument to avoid undercutting mesial and distal walls. D: Small hole is used to finish interior of cavity and to place retentive angles. Rubber dam is applied, and hand instrument is used to finish interior of cavity. E: Finished filling showing ideal outline and contour. F: Dotted lines in line drawings show variety of outlines and gingival extension to meet varying conditions

One of the difficulties encountered in using the ultrasonic method of cavity preparation is obtaining direct vision while operating. This difficulty is experienced when the washed field method is used with the high speed rotary handpiece, where vision is distorted because of the presence of the water spray. Both methods call for the development of a high degree of tactile sense.

Another problem peculiar to each method is that, because of the excessive amount of liquid necessary either as coolant or cutting medium, the use of some type of aspirator is desirable. An efficiently operating saliva ejector should solve this problem. There are various types of aspirators available (Fig. 5), all of which draw the moisture rapidly from the mouth and clear the field of liquid and debris. This makes it possible in some instances to work under a rubber dam which can be very desirable. The choice of aspirator must be left to the operator.

DISCUSSION

Carefully kept records during two and a half years of clinical application have made it possible to evaluate the benefits derived through use of the ultrasonic method. In only one instance has it been necessary to resort to an injection because of pain comparable to that caused by conventional operating methods.

Members of my family have provided me with valuable clinical material. Being familiar with the different types of reaction evidenced in the various stages of cavity preparation, it was possible to make a critical appraisal of the degrees of pain experienced. Opening the cavity and extending into the dentin was accompanied by some slight pain. Laying aside the ultrasonic tool and drawing an explorer over the freshly cut surface was excruciatingly painful. In one or two instances, I tried to proceed with the cutting with a rotary bur. The pain was unbearable if an anesthetic was not used. On reapply-

ing the ultrasonic instrument with a liberal supply of abrasive mixture, however, I was able to complete the preparation with little if any discomfort.

As of today, I know of no instance of pulp death due to operating with the ultrasonic unit. Teeth have, without exception, been free from subjective symptoms such as pain of any kind traceable to the trauma of operating. On completion, that is, the filling of teeth with whatever material may be used, the teeth have been and remain entirely comfortable.

Roentgenograms, taken as late as 19 months postoperatively, indicate no degenerative processes (Fig. 6,7).

Our early investigation[1] of ultrasonic preparations in the teeth of monkeys and dogs showed the histologic picture to be similar to that found when conventional methods had been employed. When the process was applied to human beings, the length of time any tooth was subjected to ultrasonic cutting was the absolute minimum. Care was taken not to overheat the tooth through pressure of the instrument or lack of the abrasive and water mixture. The slightest indication that the patient was aware of any type of feeling was the signal for the immediate removal of the instrument from contact with the tooth. Care plus skill are the necessary ingredients for any type of successful treatment.

Since the early reports[2] on the use of ultrasonics in dentistry, many men have made similar observations. To date, no one has refuted the earlier statements regarding the efficiency of the method or the freedom from ordinary annoyances associated with cavity preparation. All histopathological studies with the ultrasonic dental instrument on dogs, monkeys and human beings have corroborated the early findings at Columbia University. Hansen and Nielsen[3] reported damage to the continuously erupting incisors of guinea pigs after employment of an ultrasonic cutting instrument. Summarizing their report, however, they stated, "Analogous results in human beings or other animals with the same or other ultrasonic instruments cannot be assumed."

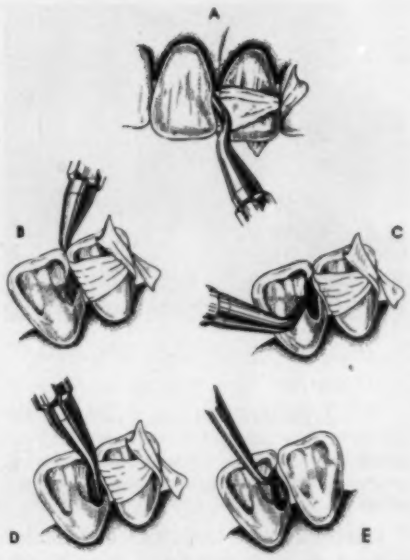

Fig. 4 • A: Bayonet-shaped flat-end Cavitip is used to enter proximal area and shape labial wall. Note use of rubber dam to protect adjoinnig tooth. B: Lingual view showing end of instrument extending through embrasure and forming part of lingual wall. C: Cylindrical tool forming axial angle from lingual approach to labial wall. D: Same cylindrical tool used to flatten gingival floor. E: Bayonet-shaped tool is used to plane gingival floor and to establish labiogingival, linguogingival and incisal retentive angles

The number of reports corroborating the early observations with regard to safety continues to increase. Zach and Brown,[4] in January 1956, reported:

1. Oman, C. R., and Applebaum, E. Ultrasonic cavity preparation. Preliminary report. New York D.J. 20:256 June-July 1954.

2. Oman, C. R., and Applebaum, E. Ultrasonic cavity preparation. II. Progress report. J.A.D.A. 50:414 April 1955.

3. Hansen, L. S., and Nielsen, A. G. Comparison of tissue response to rotary and ultrasonic dental cutting procedures. J.A.D.A. 52:131 Feb. 1956.

4. Zach, Leo, and Brown, G. N. Pulpal effect of ultrasonic cavity preparation, preliminary report. New York D.J. 22:9 Jan. 1956.

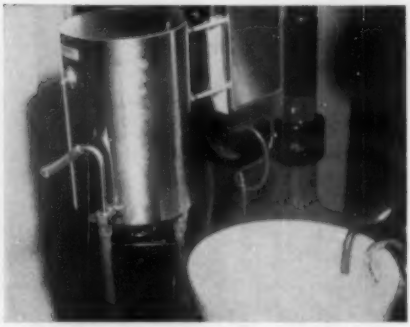

Fig. 5 • Type of aspirator

. . . the preliminary findings in histo-pathological studies on human teeth revealed no significant differences between the effects of ultrasonic dental preparation and the known effects of conventional rotary instruments.

Members of the U. S. Air Force dental research group consisting of Butt, Harris and Shannon, and Helmut Zander of the University of Minnesota Dental School, reported[5] that on the basis of histological studies on the dentitions of seven rhesus monkeys, half prepared with the ultrasonic dental unit (Cavitron) and half with rotary instruments, there was no significant difference observed in the effect on pulps or tooth structure of the two kinds of instruments.

In May 1956, Healey, Patterson and Van Huysen[6] stated that studies of the effects of rotary dental instruments and the ultrasonic dental unit on human teeth showed the reaction of the pulps to the use of the steel bur, the diamond stone and the ultrasonic instrument to be similar.

Leo Zach[7] reported on the thermogenetic effects of ultrasonic cavity preparation. The study indicated that even with working pressures well above the two to six ounces recommended, heat rise was minimal in teeth with a mass greater than one tenth of a gram.

In November 1956, Zach[8] reported that the biological effect of ultrasonic dental instrumentation on the deciduous and forming permanent teeth of rhesus and macacus monkeys was similar to that normally observed with routine instrumentation. Thirty-six Class V cavities were prepared in deciduous teeth with underlying permanent dentition. Examination of mandibular and maxillary blocks with teeth and developing follicles *in situ* after 37 days when the animals were sacrificed revealed that the pulpal reactions in the deciduous teeth were similar in the control teeth and in teeth prepared by the ultrasonic method.

Furthermore, Zach reported "...o effect is observable on the developing secondary teeth, enamel organ, Hertwig's sheath, dentinogenesis, and the resorptive processes appear normal and undisturbed."

Lefkowitz[9] reported on 240 dog teeth prepared with Airdent, with high and normal speed rotary instruments and with the Cavitron ultrasonic unit. His observations were identical for all four instruments, and he and his colleagues stated that the ultrasonic dental unit caused no more and no less damage to oral structure than does any other dental instrument now routinely used in office practice. Subsequently, Robinson[10, 11] presented a similar report.

Friedman, Lite and Solomon[12] reported on a study in which 16 teeth of

5. Butt, Byron G., and others. Histopathological evaluation of pulpal response to ultrasonic cavity preparation. Preprinted abstracts, International Association for Dental Research, thirty-fourth general meeting, St. Louis, March 1956, p. 13.

6. Healey, H. J.; Patterson, S. S., and Van Huysen, Grant. Pulp reaction to ultrasonic cavity preparation. U.S. Armed Forces M.J. 7:685 May 1956.

7. Zach, L.; Morrison, A. H., and Cohen, Gerson. Thermogenetic effect of ultrasonic cavity preparation. New York D.J. 23:123 March 1957.

8. Zach, L. Effect of ultrasonic cavity preparation on deciduous and developing dentition of rhesus and macacus monkeys. New York section meeting, International Association for Dental Research, November 19, 1956.

9. Lefkowitz, William. Ultrasonics as applied to dentistry. Presented before the Midwinter Meeting, Chicago Dental Society, February 7, 1956.

10. Robinson, H. B. G. Reactions of dental pulp to injury. American Academy of Oral Pathology, Washington, D.C., April 8, 1956.

11. Robinson, H. B. G. Pulpal effects of operative dentistry. J. Pros. Den. 7:282 March 1957.

12. Friedman, J.; Lite, T., and Solomon, H. Pulp reactions to ultrasonic tooth preparation. New York J. Den. 26:144 April 1956.

two monkeys were prepared, half with the ultrasonic dental unit and half with a bur revolving at 3,000 rpm under water. The teeth were extracted at intervals of from a half hour to three months post-operatively. No clear-cut differences were discernible between the pulps of the ultrasonically prepared teeth and those prepared with the rotary instrument.

Zinner and Whetstone[13] stated:

> . . . the ultrasonic dental unit has one advantage which we believe will prove to be of major significance in pedodontics. This is the fact that its routine use enormously reduces the fear and apprehension of the child patient, enables the operator almost to eliminate the use of anesthesia and makes it possible for the patient to accept, with comfort and without anesthesia, more actual dental work per chair hour than has been our experience with rotary instruments.
>
> This makes it possible for the operator to provide more complete and in many instances, better dental care and lays the foundation for a more pleasant and relaxed relationship between operator and child patient. . . .

On the 20 patients upon whom both rotary and ultrasonic preparations were completed, one required anesthesia for ultrasonic preparation. Of the same 20 patients, ten required anesthesia for rotary preparation. Of the total of 123 patients treated, four expressed the desire to return to rotary instruments for future dental work. The remainder, a total of 119, reported a distinct preference for the ultrasonic dental unit.

Lefkowitz and Postle[14] recently reported on an extensive clinical survey of the routine use of the ultrasonic dental unit in which 166 private practitioners reported on 121,618 preparations of all types.

The survey indicated that 91 per cent of the patients preferred the ultrasonic dental unit to whatever type of rotary instrument had previously been used on them. Responding dentists reported, furthermore, that where they normally

13. Zinner, D., and Whetstone, W. The ultrasonic dental unit in pedodontics. J.Den.Children 23:3 First Quart. 1956.

14. Lefkowitz, William, and Postle, W. Present status of airbrasive and ultrasonic equipment. In Dental Clinics of North America, March 1957. Philadelphia, W. B. Saunders Co., p. 53-63.

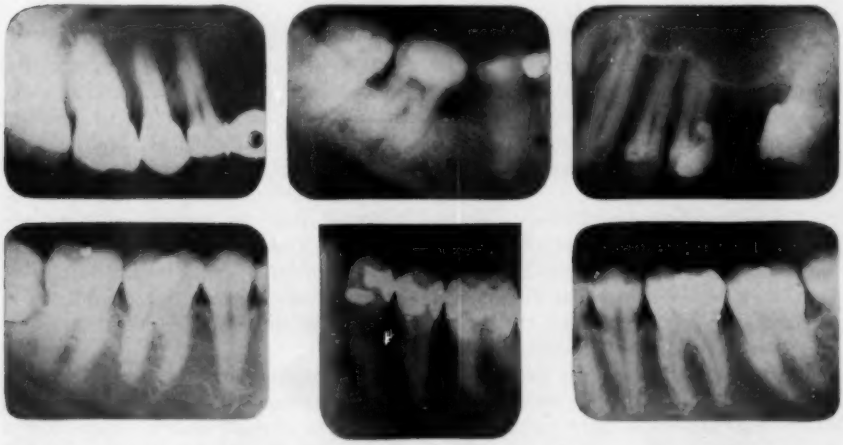

Fig. 6 • Above left: Cavities had been prepared with ultrasonic instrument on July 8, 1954. Roentgenogram taken Nov. 16, 1955. Above center: Cavity had been prepared with ultrasonic instrument June 18, 1954. Roentgenogram taken Nov. 16, 1955. Above right: Tooth cut with Cavitron instrument May 12, 1954. Roentgenogram taken June 30, 1955. Below left: Cavity prepared with Cavitron instrument. Roentgenograms taken four months later, Jan. 24, 1955. Below center: Cavity preparation, Oct. 10, 1956. Roentgenogram taken Oct. 26, 1956. Below right: Cavity preparation with Cavitron instrument. Roentgenograms taken six months later, Jan. 24, 1955

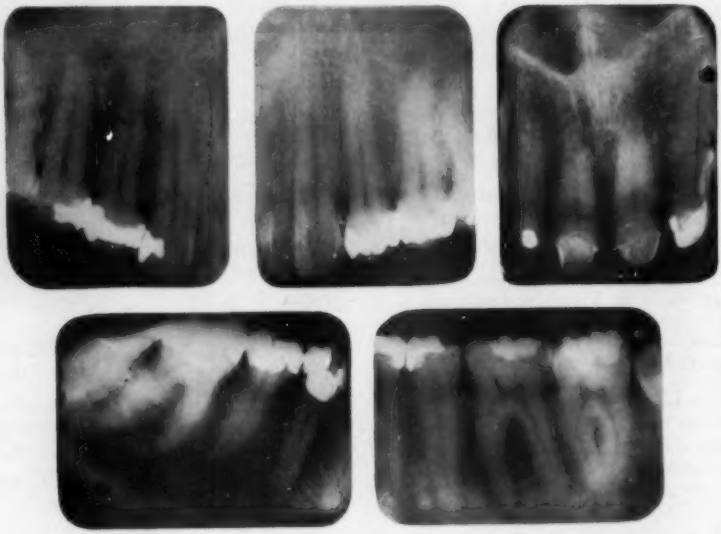

Fig. 7 • Above left: Cavity preparation with Cavitron, Feb. 23, 1955. Roentgenogram taken Jan. 31, 1956. Above center: MO cavity preparation with ultrasonic instrument March 16, 1955. Roentgenogram taken Jan. 31, 1956. Above right: Jacket crown preparations with Cavitron Oct. 28, 1954. Roentgenogram taken June 21, 1955. Below left: Cavity preparation with Cavitron May 13, 1954. Roentgenogram taken June 21, 1955. Below right: Cavity preparation with Cavitron Feb. 23, 1955. Roentgenogram taken Jan. 1956

used some form of anesthesia in 75 per cent of all preparations made with rotary instruments, only 21 per cent of preparations on the same patients required anesthesia when the ultrasonic dental unit was used.

The responding practitioners also reported that in 80 per cent of all preparations completed with the ultrasonic dental unit, they were satisfied that the finished cavities were as fine or better than those they routinely made with rotary instruments. This judgment was based on a comparison of line and point angles, cavity floor and walls, instrument accessibility and mechanical retention obtained with both forms of instrumentation.

Robinson[15] reported postoperative discomfort in less than one tenth of 1 per cent of instances in which the ultrasonic dental unit was used, which further attests to the safety and gentleness of the instrument from a clinical point of view. In summary, he states that, as a result of the extensive biological and clinical evaluation already completed with the ultrasonic dental unit, "It can safely be reported that the instrument is entirely safe as a routine dental instrument, having proven to be at least as safe as all other conventional dental instruments in all studies undertaken on human type teeth."

The encouraging nature of these reports has stimulated interest in this method of tooth preparation to the extent that there are now clinical reports of well over a million individual cavity prepara-

15. Robinson, H. B. G. Ultrasonics in general dentistry. Presented as part of symposium, "Newer developments in cutting tooth structures," Greater New York Dental Meeting, December 4, 1956.

tions in human teeth. These preparations have been made by men of varying degrees of ability in every section of the country, and all or nearly all report a minimum of patient discomfort and an amazing lack of subjective symptoms after these operations on the teeth.

CONCLUSIONS

1. Extensive study of cavities prepared with the ultrasonic dental unit during the past three years (1954-1957) has produced convincing evidence that the instrument is as safe as any other conventional instrument for routine office use. The original observations regarding safety made at Columbia University (June 1954) have since been corroborated by five widely separated dental research groups working independently in university, Armed Forces, and hospital research centers.

2. Intensive clinical use has proved that the ultrasonic dental unit can be used routinely to complete every type of preparation for which restorations must be constructed with a minimum of pain and annoyance to the patients.

3. The special nature of the ultrasonic cutting process makes it possible to obtain intricate cavity forms with a minimum of effort, and the cavity walls are smooth.

4. The elimination of rotary motion also eliminates all possibility of lacerating soft tissue, and the use of an air-water-abrasive cutting mixture removes all possibility of overheating the tooth and injuring the pulp. These safety factors make it possible for the operator to work without tension or fear and significantly reduce the patient's apprehension.

Ancient Insights • To gnash or grind the teeth, unless this has been a habit from childhood, is a sign of madness and death. If a patient who is already out of his mind does this, then it is certainly fatal. It is also fatal when teeth become dry. . . . Mortification of a tooth brings an end to a gingival abscess. . . . When severe fever and delirium supervene on mortification of a tooth, it is a sign of death. If recovery takes place, there will be suppurating ulcers and sequestration of the bone. . . . There is the danger, when there is violent pain in the jaws, that there will be sequestrum formation in the bone. . . . Pursing of the lip denotes a bilious flux of the bowels. . . . Bleeding from the gums on top of relaxed bowels is a fatal sign. *Hypocrates.*

Débridement in endodontics

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Although in recent years there has been considerable research on antibiotics and their application in endodontic treatment,[1-4] the important phase involving the débridement of the root canal has not been sufficiently stressed.

The term "débridement" connotes the removal of all foreign material and aseptic excision of all contaminated and devitalized tissue.[5] As in any surgical procedure, débridement should be complete in root canal therapy.

The significance of thorough débridement was demonstrated by Sommer and Ostrander.[6] In their study they included infected root canals which showed positive cultures before any treatment was undertaken. These canals were thoroughly reamed and cleansed and subsequently irrigated with sodium hypochlorite or, in many instances, simply irrigated with sterile tincture of green soap. The canals were then flushed with sterile warm water. After the canals were dry, a second culture was made. In a high percentage of instances, the authors reported, negative cultures were obtained --and this after mere débridement.

Admittedly, the polyantibiotics have effected a rapid sterilization of root canals; however, a therapeutic agent will be an effective disinfectant only if the canal has been thoroughly smoothed and cleansed. Preparation of the entire length of the infected canal to its fullest width is essential. Only then can the irrigating, suctioning and drying procedures be carried out adequately for the removal of pulp remnants, necrotic tissue, dentin shavings, secretions, chemical residues and other possible debris. A larger canal surface, properly smoothed and cleansed, permits a greater amount of the therapeutic agent to be introduced into the canal and assures more effective action of the drug.[7]

In this paper primary consideration is given to irrigating, aspirating and drying procedures which form a part of the débridement process. In an attempt to overcome some of the technical difficulties in these procedures, certain features of the endodontic armamentarium have been modified and further developed.

RUBBER DAM HOLDER OF NEW DESIGN

A special rubber dam holder (Fig. 1) was developed and used in endodontic treatments at the Randolph Field Air

1. Grossman, L. I. Treatment of pulpless teeth with a polyantibiotic paste. J. Canad. D.A. 18:181 April 1952.

2. Bender, I. B., and Seltzer, S. Combination of antibiotics and fungicides used in the treatment of the infected pulpless tooth. J.A.D.A. 45:293 Sept. 1952.

3. Ostrander, F. D. Use of antibiotics in periodontics and endodontics. J.A.D.A. 46:139 Feb. 1953.

4. Buchbinder, Maurice, and Bartels, H. A. Criticism of the use of root canal cultures in evaluating antibiotic therapy. Oral Surg., Oral Med. & Oral Path. 4:886 July 1951.

5. Woolsey, J. H. Débridement. Am. J. Surg. 82:179 July 1951.

6. Grossman, L. I., editor. World conference on endodontics, 1953. Philadelphia, Stephenson Bros., 1953, p. 61.

7. Grossman, L. I. Polyantibiotic treatment of pulpless teeth. J.A.D.A. 43:265 Sept. 1951.

Force Base clinic. With this device, it was possible to carry out irrigation procedures easily and conveniently. Copious amounts of irrigation solution can be flushed into the canal and the return flow of the solution is caught in the rubber dam pouch and carried off by the drainage tube. The use of the chin basins and cotton rolls close to the operative field is unnecessary, and the possibility of accidental spilling of the solution is minimized. Another practical feature is that the device leaves both hands of the operator free to direct the irrigation syringe; there is less crowding of the operative field, thus fewer chances of contaminating the sterile field. This device may be used also when the rubber dam is applied for cavity preparations and irrigation is carried out.

The new device consists of a metal frame holder to which has been added a wire extension at its horizontal bar. This extension is shaped so that a pouch or pocket is formed when the lower portion of the rubber dam is wrapped around it. Special lugs provide anchorage for the rubber dam (Fig. 1, left). The different steps in the application of the holder and dam are shown in Figure 2. A self-retaining drainage tube is anchored in the rubber dam pouch at its most dependent point by means of an adapter inserted from below through a hole made with the rubber dam pouch. No leakage is possible since the rubber dam will be tight around the neck of the adapter. The other end of the drainage tube can be placed directly into the cuspidor of the dental unit or, preferably, be connected to the tubing of the saliva ejector, which will provide suction for evacuation of the irrigation solution. At the same time a "Y" connector permits operation of the saliva ejector in the patient's mouth. In addition, two small cotton rolls may be placed in the rubber dam pouch for quick absorption of the fluid.

Another design of a rubber dam

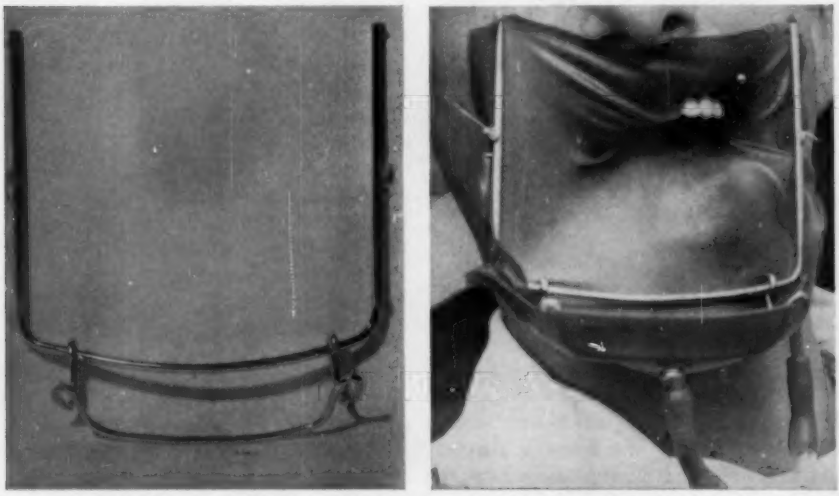


Fig. 1 • Left: Metal frame holder with wire extension which is so shaped that a pouch is formed when the lower portion of a rubber dam is wrapped around it. Right: Metal frame holder and rubber dam in situ for evacuation of irrigation solution. Self-retaining drainage tube with adapter is anchored in rubber dam pouch. A "Y" connector permits operation of saliva ejector at same time

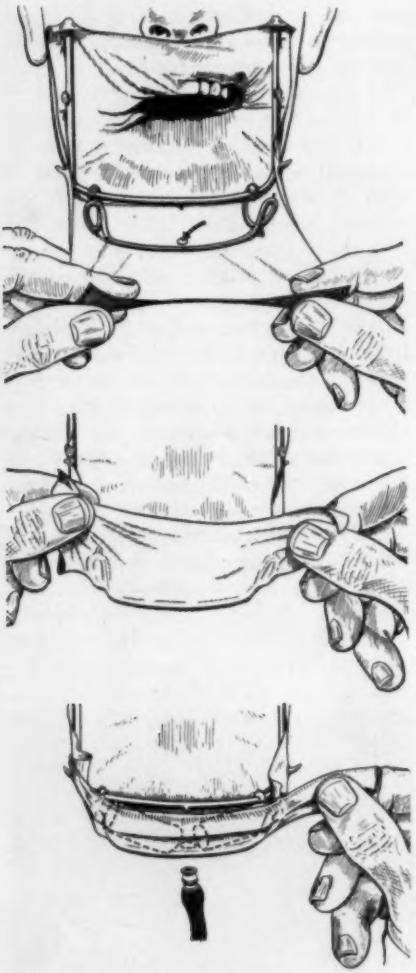


Fig. 2 • Successive steps of applying newly designed frame holder and rubber dam. Arrows point to hole punched in rubber dam pouch to receive adapter with rubber tubing

holder is shown in Figure 3, left. Made of plastic material, the frame is shaped to adapt itself and the rubber dam to the contour of the face. Adjustable, elastic bands extending behind the head keep the frame and rubber dam in place with metal snaps and lugs. A wire extension, similar to the one already described, is also provided for the formation of a rubber dam pouch.

NEEDLES FOR IRRIGATING, ASPIRATING AND DRYING

For the purpose of irrigating, aspirating and drying, it has been found advantageous to keep in readiness various stainless steel hypodermic needles, approximately one and one fourth inches in length and varying from 15 to 27 gauge in size. The needles are bent to an obtuse angle and their bevels removed. The appropriate needle is inserted in the canal at least two thirds or more the length of the well-reamed canal so that the solution will reach the apical portion of the canal. Sufficient space between canal wall and needle allows the return flow of the solution. Figure 3, right, illustrates an aspirating needle made from a hypodermic needle. A soft rubber cone (from an anesthetic ampule)[8] is mounted on the needle with a metal stop and provides a seal at the mouth of the canal to assure a good suction effect. Applying and breaking the seal intermittently at the mouth of the canal helps to dislodge debris and fluids in the canal. For drying and complete dehydration, which reduces the chances of bacterial growth, the needle is fitted to a small glass (or plastic) container filled with sterile cotton and gauze through which warm air passes (Fig. 3, right).

IRRIGATION AND ASPIRATION COMBINED

Thorough irrigation and aspiration of well-reamed canals can be achieved through a modification of the Seidner method[9] by the following assembly (Fig. 4):

8. Samaha, F. J. Personal communication.

9. Seidner, S. Suction apparatus used in treatment of gangrenous root canals. J. Endodontia 1:38 Dec 1946.

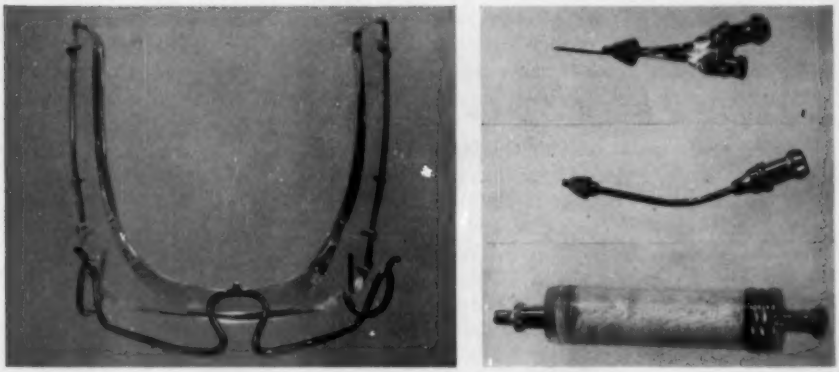
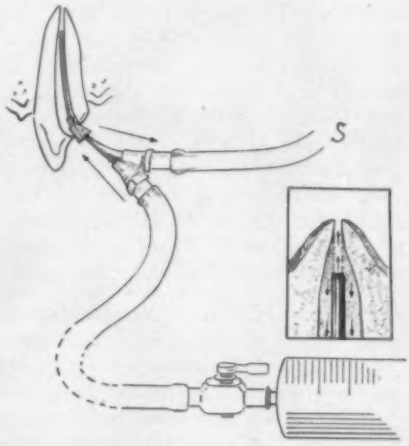


Fig. 3 • Left: Plastic frame holder with wire extension for formation of rubber dam pouch. Right: At top, needles for irrigation and aspiration are soldered together; center, aspirating needle with rubber cone and metal stop; bottom, plastic container with sterile cotton and gauge through which warm air passes for drying of canal

Fig. 4 • Irrigation and aspiration combined is achieved with a modification of the Seidner method.[9] Arrows indicate direction of flow of irrigation fluid from syringe through the root canal to the aspirator (S). Insert shows the irrigation needle in position, providing good flushing effect



A small gauge hypodermic needle reaches about two thirds the length of the canal for irrigation and a large gauge hypodermic needle enters the pulp chamber for a short distance for suctioning. These needles are soldered together near their hubs and are bent at an obtuse angle as illustrated in Figures 3, right, and 4. A soft rubber cone surrounds both needles to assure a close seal at the mouth of the canal. A negative pressure is established in the root canal with the aspirator, and the irrigation fluid is flushed the length of the canal when the stopcock (or clamp) at the syringe is opened. The fluid is aspirated from the canal into the suction bottle by means of a transparent tubing when the stopcock (or clamp) is closed.

With an efficient suction pump, large amounts of liquid can be flushed through the canal. *In vitro* tests showed that the apical portion of the canal was more thoroughly irrigated when the small gauge needle entered at least two thirds the length of the canal.

COMMENT

The rationale of irrigating, aspirating and drying lies in the establishment of surgical cleanliness in the root canal. Even the best sterilizing agent is unable

to remove the debris from the canal and, in fact, only fixes the residue material to the canal wall. The use of paper points to dislodge debris and secretions cannot insure surgical cleanliness.

The question may be raised: How much can the effervescence of nascent oxygen be relied on to add to the mechanical cleansing of the canal and to alter the anaerobic condition in inaccessible crevices of the canal? This is difficult to evaluate clinically. Although it has been shown *in vitro* that chlorine compound solutions bring about lysis of pulp tissue most effectively,[10] there still remains the clinical problem of how long and how often irrigation has to be carried out. The drainage, which appears clear to the naked eye, may contain particles of microscopic size. It is better to irrigate too much rather than too little the full length of the canal. Irrigation removes not only debris, secretions, bacteria and toxins but also dislodges loose blood remnants in otherwise inaccessible crevices of the canal and often promotes rapid clotting at the severed pulp. Furthermore, drainage of the acutely and chronically infected periapical region is greatly helped by irrigating as well as suctioning the root canal. Serous and purulent secretions can be aspirated effectively from the canal and the periapical region; irrigation also provides fast relief from pain.

Difficulty in treating teeth with decomposed pulps is increased if access cannot be gained to infected accessory canals and regions of infected dentin. Bacteria and toxins in these regions may or may not be made impotent by sterilization and subsequent filling of the root canal. The end result will determine whether or not the tooth remains a focus of infection.

SUMMARY

Surgical cleanliness in the root canal is a prerequisite to successful endodontic treatment. It is the result of thorough cleansing, irrigating, aspirating and drying of the canal. Certain features of the endodontic armamentarium have been modified to develop a rubber dam holder which facilitates irrigation procedures.

8515 Delmar Boulevard

10. Grossman, L. I. and Meiman, B. W. Solution of pulp tissue by chemical agents. J.A.D.A. 28:223 Feb. 1941.

Our Schools • People sometimes refer to higher education as the higher learning, but colleges and universities are more than knowledge factories; they are testaments to man's perennial struggle to make a better world for himself, his children, and his children's children. This, indeed, is the sovereign purpose of our schools. They are great fortifications against ignorance and irrationality; but they are more than places of higher learning—they are centers and symbols of man's higher yearning. *W. H. Cowley.*

Leukemia as a dental problem

Harold S. Sinrod, U. S. Army

During the last century, the dental profession has become increasingly aware of the importance of recognizing subtle alterations within the oral soft tissues that may herald the incipient stages of oral or systemic disease.

Of all the systemic disturbances with attending oral symptoms, the blood diseases in general and the leukemias in particular should be understood and readily suspected by the dental practitioner who, in many instances, is consulted first by the leukemic patient because of dental complaint. This may be explained by the fact that in leukemia there is some type of oral manifestation found in approximately 55 per cent of patients with acute forms, 15 per cent of patients with chronic forms and 44 per cent of the total number of leukemic patients. Very often these manifestations are the first to be seen clinically.

It is obvious that the importance of this disease to the dentist cannot be overemphasized, since he is in an ideal position to detect it relatively early in its course.

GENERAL CONSIDERATIONS

Leukemia is a disease of unknown etiology and fatal termination which is due to a neoplastic change in the blood-forming tissues. In most instances the change is accompanied by a flooding of the blood and tissues with an excess of white cells, including many immature or abnormal forms. It occurs in all human races, being more common in Caucasians (with Hebrews found especially susceptible to the chronic lymphatic type). It is seen more often in the male sex than in the female, with no age group exempt. The disease is not thought to be transmitted from mother to child, although heredity may have some influence, especially in the lymphatic type. The incidence is higher in the first five years of life, with most of the instances until the age of 20 of an acute nature. From age 5 to 50, chronic myelogenous leukemia predominates, whereas after 50 the chronic lymphatic type is reported most frequently. It must be kept in mind, however, that acute forms may occur in older individuals (as reported hereafter in Case 1) and, conversely, myelogenous chronic forms may appear in children. Monocytic leukemia, which is more often acute than chronic, favors middle age. The disease has a relatively low incidence, with from 4,000 to 6,000 cases reported in the United States each year.[1]

Certain general pathologic conditions must be taken into consideration when leukemia is suspected. The bone marrow considered as a blood-forming organ is large and labile in the adult, comprising about 1,400 cc., almost the size of the liver. Normally, only a small portion of this organ, represented by the red marrow, is active in hematopoiesis. When

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1. Wintrobe, Maxwell M. Clinical hematology, ed. 2. Philadelphia, Lea & Febiger, 1946, pp. 666-675.

there is an increased demand for blood cells, the remaining latent yellow or fatty marrow is replaced by active red marrow. In leukemia the entire marrow may be activated into grayish-red, densely cellular leukoblastic tissue with the resulting impingement on erythroblastic tissue, causing anemia and thrombocytopenia.[2] The disease is classified as to form, which refers to the acuteness or chronicity manifested, and type, which refers to the predominating cell concerned.[3]

Acute Leukemia • In general, it is difficult to distinguish the acute leukemic types from one another. They occur mostly during the first decade of life, usually with a gradual onset followed by a rapid course of a few weeks to months. The early stages may be aleukemic (in which case excessive or abnormal white cells are not found in the peripheral blood), but later the white count becomes very high, though not as high as the extremes recorded in the chronic forms. The associated anemia and thrombocytopenia are often severe. The majority of the white cells observed are either myeloblast, lymphoblast or monoblast, and are difficult to distinguish in such an immature state, which makes a definitive diagnosis, at times, a problem.[2]

The bone marrow in acute leukemia is hyperplastic and packed with the same primitive cells observed in the peripheral blood and tissues. In addition, leukemic infiltration takes place in most of the organs of the body.[2]

The monocytic type of leukemia which occurs most frequently in the acute form is typical of this form, and a brief discussion follows.

Acute Monocytic Leukemia • Acute monocytic leukemia is of particular importance to the dentist (as are all acute types) because it often runs an acute course frequently associated with oral manifestations. With the stomatitis there may also be progressive pallor, fever, weakness, lymphadenopathy, and slight splenic enlargement. The hematologic observations include a progressive secondary anemia and leukocytosis (15,000 to 50,000 white blood cell count) with the presence of many immature monocytic forms in the blood and marrow.

The cells of origin in monocytic leukemia are still a matter of discussion, and opinions differ as to which cells are the immature precursors. In some instances the blast forms found seem to be intermediate in nature between myeloblasts and mature monocytes; in others, intermediate in nature between reticuloendothelial cells and monocytes. The former is classified as the Naegeli type, and the latter as Schilling's type.[4]

Chronic Leukemia • Because of the more prolonged course of chronic leukemia (80 per cent of persons with it live one year; 40 per cent three years; 20 per cent five years and 4 per cent survive ten years or longer) and the predominance of the mature leukocytes in the blood, the problem of classification into types is much simpler.[5] In contrast to acute leukemia, the onset of chronic leukemia is so gradual and insidious that it may be discovered only accidentally in the course of routine blood examinations, or in individuals seeking medical assistance because of gingivitis, anemia, loss of weight, anorexia, flatulence, recurring attacks of diarrhea, or unexplained fever.[5] A brief general description of the types of chronic leukemia follows.

Chronic Myelogenous Leukemia • In chronic myelogenous leukemia there is

2. Anderson, W. A. D. Synopsis of pathology. St. Louis, C. V. Mosby Co., 1950, p. 445.

3. Barnfield, W. F. Leukemia and dental procedure. A review of the literature and study of 123 cases. Amer. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 31:329-353 June 1945.

4. Brayshaw, H., and Orban, B. J. Oral manifestations of reticuloendotheliosis. Oral Surg., Oral Med. and Oral Path. 6:869 July 1953.

5. Kolmer, J. A. Clinical diagnosis by laboratory examination, ed. 2. New York, Appleton-Century, 1949, p. 675-683.

an increase in the granular leukocytes, with many immature myeloblast and myelocyte forms, from the normal of 6,000 to 10,000 per cubic millimeter to very high levels, sometimes 500,000 to 1,000,000 or more per cubic millimeter. There may also be an increase in the platelet count and progressive drop in the red cell count. The essential lesion is a myeloid hyperplasia throughout the bone marrow, which precedes the peripheral manifestations. It becomes grayish-brown and fairly firm as a result of the pathologic process. The spleen becomes enormously enlarged, dark red and firm, with masses of myeloid cells replacing lymphoid tissues and obscuring the usual splenic architecture. The liver is also considerably enlarged and infiltrated with myeloid cells. Similar but milder infiltration is found in the kidneys, heart and other viscera, with an unusual number of leukocytes noted in the lumina of blood vessels. The lymph nodes are often found slightly enlarged.[2]

Chronic Lymphatic Leukemia • In instances of chronic lymphatic leukemia usually the white count is lower than that found in the myelogenous type—often below 100,000 with a differential showing 90 per cent or more lymphoid cells in many instances. The normal differential count is:

Agranular leukocytes	small lymphocytes	25 per cent
	large lymphocytes	3 per cent
	monocytes	1-2 per cent
Granular leukocytes	eosinophils	3 per cent
	basophils	.5 per cent
	neutrophils	65-70 per cent

Red cell reduction and anemia occur in later stages but to a lesser degree than in the myeloid type. There is a generalized enlargement of the lymph nodes which become diffuse masses of lymphoid cells. In addition there is a moderate enlargement of the spleen due to lymphatic hyperplasia, but not to the extent seen in the myeloid type where splenic enlargement is characteristic. The bone marrow is hyperplastic throughout, being firm, grayish-red and similar grossly to the marrow of myeloid leukemia.[2]

ORAL CONSIDERATIONS

Oral manifestations are frequently the initial signs of leukemia, particularly in the acute forms, prompting the patient to consult the dentist first.[6] It is imperative that the dentist recognize these leukemic conditions as early as possible because of the danger, in some instances, of oral surgical interference and also the necessity of medical attention.

Resch[7] reviewed 172 cases over a five year period at the Cleveland Clinic and found that the oral condition in leukemia may be due to (1) loss of clotting factors in the blood, (2) a loss of protective elements in the blood and (3) the infiltration of the oral mucosa by the leukemic cells.

Glickman[8] cautioned that the oral clinical observations are more of suggestive than pathognomonic evidence in the diagnosis of leukemia, because the associated oral signs are similar to those seen in other blood diseases, and because secondary inflammatory changes may produce a wide range of superimposed alterations in the oral picture. If, however, the patient exhibits lassitude, pallor, loss of weight, lymphadenitis and other signs of leukemia in addition to the oral symptoms, the dentist should immediately suspect leukemia. A careful history, evaluation of the blood and differential counts and consultation with an in-

6. Thoma, K. H. Oral pathology: a histological roentgenological, and clinical study of the diseases of the teeth, jaws, and mouth, ed. 3. St. Louis, C. V. Mosby Co., 1950, pp. 1199-1207.

7. Resch, C. A. Oral manifestations of leukemia. Am. J. Orthodont. & Oral Surg. 26:901 Sept. 1940.

8. Glickman, Irving. Clinical periodontology: the periodontium in health and disease. Philadelphia, W. B. Saunders & Co., 1953, p. 455.

ternist are absolutely essential to confirm or deny suspicions in such a situation.[9]

An examination of the records of 99 leukemic patients treated at Walter Reed Army Hospital during the last five years revealed that 55 per cent (40 out of 73 cases) of the patients with acute leukemia were admitted with decided oral manifestations. In detail, 10 out of 11, or 91 per cent of the patients with the acute monocytic form; 21 out of 45, or 47 per cent of the patients with the acute lymphatic type, and 9 out of 17, or 53 per cent of the patients with the acute myelogenous type, were so affected. This observation was made prior to the administration of any therapeutic agents capable of producing oral lesions, therefore it is safe to assume that 55 per cent of persons with acute leukemia might approach the dental practitioner for advice and treatment early in the course of the disease.

Of the patients with chronic leukemia studied it was found that only 15 per cent (4 out of 26) had oral symptoms. In detail, 3 out of 17, or 17 per cent of those with the chronic myelogenous form; 1 out of 9, or 11 per cent of those with the chronic lymphatic type and 0 of 1, or none of those with chronic monocytic form, were so affected. It is easy to see that the dental problem is not as apparent in the chronic form as it is in the acute.

In all the patients examined regardless of type or form of the disease, 44 per cent (44 out of 99) showed obvious oral changes. In addition, palpable lymph nodes were detected in the region of the head and neck (easily examined by the dentist suspicious of leukemia) in 69 per cent of the patients (75 per cent of those with the acute form and 50 per cent of those with the chronic type).

ORAL MANIFESTATIONS

In acute leukemia the first oral manifestations commonly arise in the region of the head and neck, with a possibility of all the oral structures undergoing change. It is obvious that the systemic characteristics of acute leukemia are primarily responsible for these changes, which may appear as: (1) considerable pallor of the oral mucosa, (2) ulceration with necrosis of the mucous membrane, (3) a tendency to bleed without injury, (4) petechiae or ecchymotic regions, (5) hypertrophy with blunting of the interdental papillae, which may be a primary enlargement of the tissues because of massive leukemic infiltration or a secondary inflammatory reaction to local irritation, or both, (6) painful gingiva, (7) toothache because of the leukemic infiltration of the capillary bed in the dental pulp inducing by pressure the pain of pulpitis, (8) periodontal infections because of the lowered resistance of the infiltrated periodontal tissues to infection and irritation, (symptoms may arise that appear to be of a local periodontal origin, and they may be treated as such by the unsuspecting dentist, as in Case 1), and (9) cyanotic discoloration of the gingival mucosa. These symptoms were found to appear alone or in combination in 40 of the patients with acute leukemia studied at Walter Reed. The type of leukemia was apparently not a determining factor in the oral picture observed because the symptoms were seen with equal frequency in all types of the acute form.

Chronic Leukemia • Reporting on chronic leukemia, Thoma[6] stated that in chronic myelogenous types, acute and chronic gingivitis with some ulceration are common, as is a tendency to spontaneous hemorrhage. Bernier[10] reported hypertrophy of the interdental papillae which resembles a hypertrophic gingivitis, local hemorrhage frequently with large areas of ecchymosis and ulcerative or desquamative gingival reactions with

9. Dewey, A. R. Acute lymphatic leukemia: with a fatal termination: report of case. J. Oral Surg. 8:57 Jan. 1950.

10. Bernier, Joseph L. Manual for the differential diagnosis of oral lesion. St. Louis, C. V. Mosby Co. 1942, p. 81.

the production of fetid breath. Similar observations were recorded in three instances of this type treated at Walter Reed Army Hospital.

Chronic Lymphatic Types • Thoma[6] mentioned the observation of noticeable hypertrophy of the gingiva in some chronic lymphatic types, and ulceration in others. He saw that the patient was especially susceptible to superimposed Vincent's infection. Also, as a result of the hypertrophic process, there may be the formation of localized lesions called lymphomas which sometimes break down and ulcerate. These ulcerations are characterized by necrosis and gangrenous degeneration with a dark brown exudate and foul fetor oris. The tongue is frequently swollen and dark and an outstanding symptom, in many instances, is an associated regional adenopathy.

Chronic Monocytic Types • Chronic monocytic leukemia is extremely rare, and therefore further discussion of this type is unnecessary. Barnfield[3] remarked that if oral conditions are manifested in chronic leukemia, they are probably related in some way to the following systemic characteristics of the disease: (1) hypermetabolism of the patient, (2) increased tendency to bleed and (3) anemia. He also cautioned that similarly, as in the acute forms, the oral signs of chronic leukemia may be thought to be caused by local factors alone, and thus result in the extraction of teeth or other treatment without considering the possibility of systemic disease.

ORAL LESIONS

The gingiva in acute leukemia is seen to be densely and diffusely infiltrated by predominantly immature leukocytes—in the attached and marginal areas. There usually appears to be displacement of normal connective tissue components of the gingiva by leukemic cells, the nature of which depends on the type of leukemia involved.

In the connective tissue, almost without exception, the papillary layer appears as a striplike edematous zone containing comparatively few leukocytes, separating the underlying dense cellular infiltration from the overlying epithelium. There is distension of the blood vessels which appear to be filled with cells affected with leukemia.

The epithelium is altered and may be thinned or hyperplastic. Degeneration associated with intercellular and intracellular edema and leukocytic infiltration with diminished surface keratinization are common.

The marginal gingiva in some instances seems to manifest a notable inflammatory component in addition to the leukemic infiltration seen elsewhere in the gingiva. Also, the inner aspect of this same tissue often is ulcerated, and marginal necrosis with pseudomembrane formation may be present. The alveolar bone and periodontal membrane may be involved in acute and subacute leukemia.[8]

In chronic leukemia, Glickman[5] observed there may be no notable clinical manifestations, and, consequently, no characteristic histopathological picture. Thoma[6] pointed out that the chronic lymphatic appearance, in particular, is nonspecific, because it could not be distinguished from a chronic inflammatory reaction. Anday[11] concurred that the histological change in the acute form is specific, whereas that in the chronic is not.

Bernier[10] stated that there are no specifically diagnostic histological findings in the oral mucosa with the exception of (1) mild acanthosis, (2) hydropic degeneration and (3) slight hyperkeratosis. He added that inflammatory changes are not outstanding except in the more severe

11. Anday, George; Orban, Balint, and Wentz, F. M. Histopathologic changes in the gingiva in leukemia. J. Periodont. 20:119 Oct. 1949.

and acute forms, in which secondary infection followed by necrosis may occur.

Relation of Local Irritation to the Oral Picture • Local irritants are a most important factor in the oral manifestations of leukemia. In fact, it has been observed that some patients with a minimum or absence of oral local irritants may display practically no sign of periodontal reaction to acute or subacute forms. Since the gingival tissues become inflamed and degenerated because of the pronounced infiltration of the underlying connective tissue layer, the region becomes susceptible to bacterial infections of unusual severity.[8] A poor hygienic condition, with heavy deposits of calculus adherent to the teeth, is able to produce an exaggerated inflammatory reaction in the gingival mucosa (as reported in Case 2). In addition, or in combination, periodontal pockets containing debris possibly tolerated in health may exacerbate a severe response when the blood picture is altered as it is in leukemia (Case 1).

These local disturbances, superimposed on the primary disease processes, may in turn complicate the over-all situation by producing associated side effects such as (1) systemic bacteremia, (2) anorexia and nausea, (3) blood loss from gingival hemorrhage and (4) oral pain.

Treatment of Oral Lesions • In the dental treatment of oral lesions extreme caution is advocated by the majority of authors whose opinions are expressed in the literature. Barnfield[3] concluded that approximately 50 per cent of patients with leukemia who underwent dental operations became more acutely ill shortly thereafter, implying that the treatment was responsible. It is more probable, though, that the dental complaint requiring treatment was the first clinical sign of the leukemia, which would have fully manifested itself with or without the dental interference.

There are authors who prefer a radical approach to the problem by claiming that, in certain instances, carious teeth may be the etiologic factor in the leukemia, and extraction results in recovery.[12] It would appear to be much wiser and more propitious to compromise than to be too cautious or too bold in the treatment of these patients. Even though an overwhelming number of acutely ill leukemia patients rapidly expire, it is dentistry's responsibility to make, if possible, their last days more comfortable. Often they are unable to masticate efficiently because of massive gingival enlargements. In other instances, necrotizing inflammation, which is a very painful process, can make the patient so unmanageable as to complicate his medical care.

Both of these conditions can be considerably alleviated by removing or reducing the local factors so often associated with them. By careful curettage, under topical anesthesia if necessary, the superficial calculus which is so irritating to the leukemic soft tissue should be safely eliminated. Gentle sponging of the entire gingiva should be instituted to prevent the accumulation of debris. Glickman[8] recommended that this procedure be carried out in stages which limit the treatment to small areas at each visit. He also utilized penicillin locally and systemically to preclude or minimize the chances of postoperative infection. It might be added that such a periodontal treatment of leukemia patients is, to a certain extent, a morale builder. It gives the patient a glimmer of hope when he recognizes some improvement in a condition that is all too morbid in its inexorable course. Many have been known to look forward anxiously to their periodic visits to the dental clinic for supportive treatment.

Craver[13] advised a regular program of

12. Friedenberg, Mervyn. Leukemia, role of the dentist in diagnosis and treatment. J. California D. A. 23:177 Nov.-Dec. 1947.

13. Craver, L. F. Lymphomas and leukemias and their oral manifestations. New York D. J. 13:237 May 1947.

power-spray cleanings, twice-a-day, and trimming off of the necrotic slough, followed by blowing sulfathiazole powder on the ulcer. He also stated that a soft brush soaked in warm water dipped in mild unscented soap is useful in maintaining good oral hygiene for these patients.

Krogh[14] reported the use of zinc oxide and eugenol paste packs to protect exposed bone in ulcero-necrotic lesions for the comfort of the patient.

Most authorities agree that extraction, especially in acute forms, should be performed only in emergencies. Thoma[6] wrote that surgical procedures should always be followed by local and parenteral penicillin therapy. Craver[13] suggested that antihemorrhagic measures should be available before surgery, such as (1) styptics, (2) epinephrine, (3) fibrin foam and (4) vitamin K. It might be added that immediate acrylic splints could prove effective in controlling postoperative hemorrhage.

At Walter Reed Army Hospital, a patient being treated for chronic myelogenous leukemia required the extraction of two maxillary bicuspids and three maxillary incisors because of periapical abscess formation. After extraction of the teeth, the soft tissue margin was tightly sutured over the sockets to minimize secondary hemorrhage. Nevertheless, moderate oozing persisted for 12 hours postoperatively until Kutapressin was administered and 50 mg. protamine given intravenously as well as 200 mg. protamine intramuscularly. Hemorrhage ceased and the areas healed normally. The same patient experienced seven days of secondary hemorrhage after an extraction performed three months previously with no antihemorrhagic measures taken.

Again it should be emphasized that treatment should never be instituted prior to a careful study of the bleeding time, clotting time and platelet count, or before consultation with the hematologist caring for the patient.

CASE 1

A 64 year old white man was apparently in good health when he came to the dental clinic at Walter Reed Army Hospital on November 21, 1954, with a complaint of pain in the upper right molar region. Clinical examination revealed a cyanotic bluish-red discoloration of the gingiva with evidence of some hemorrhage and a little swelling. Careful probing disclosed a relatively deep periodontal pocket between the first and second molars which was confirmed by roentgenographic study. There was no indication of pulpal involvement of the molars, and it was felt that an infection in the pocket was causing the patient's discomfort. Deep curettage was followed by irrigation with urea peroxide to remove the purulent hemorrhagic contents of the pocket. The patient was given 600,000 units of procaine penicillin intramuscularly and told to come back to the clinic the next day. The treatment was repeated November 22 and 23 at which time the condition had subsided to such an extent that the patient was dismissed.

Two or three days later the patient observed multiple small ecchymotic areas over his legs, arms and chest with a negative history of trauma, and also the appearance of a small furuncle at the left angle of the mouth which became enlarged and encrusted. During this last week in November, progressive weakness and malaise developed, accompanied by several painful swellings in the region of the neck and submental area, plus low grade fever. Because of this condition as well as another gingival lesion, the patient again reported to the clinic December 1, 1954. When the general debility and pallor were noted in addition to the presence of many small petechiae in the oral mucosa, a blood disease was suspected.

14. Krogh, H. W. Aleucemic leukemia. Oral Surg., Oral Med. & Oral Path. 3:1142 Sept. 1950.

He was then admitted to the hospital for a complete examination.

Physical Examination • The physical examination records were: height 5 feet 10 inches; weight 160 pounds; temperature 100°F.; pulse 84 and blood pressure 125/70. The patient was a well-developed, well nourished man who appeared pale but not in great distress. Examination of the head and neck revealed palpable submental and anterior cervical firm and fairly tender nodes varying in size from 1 to 4 cm. Examination of the eyes and ears revealed nothing remarkable, although the nose disclosed a reddened mucosa with a small amount of dried blood in each nostril. The oral mucosa showed multiple small petechiae and a hemorrhagic lesion 1 cm. in diameter below the lower right molar. The liver and spleen were nonpalpable and the arms, legs and chest of the patient were covered with ecchymotic areas and petechiae.

Laboratory Data • Facts assembled by the laboratory were: admission hemoglobin 9.4 Gms; white count 34,000 with 6 per cent lymphocytes and 94 per cent blastocytes. Red count was 3,200,000; platelets 8,000; hematocrit 28 and reticulocytes 1.1 per cent. On December 2 the white count was 62,000, with almost all the blastocytes considered to be of the monocytic variety. December 6 the hemoglobin was 12 Gms., the white count 35,000 and platelet count 5,250. December 10 the hemoglobin was 12.3 Gms. with a white count of 83,500—18 per cent leukocytes and 82 per cent blastocytes. December 11 the white count was 58,500 with 1 neutrophil, 13 per cent lymphocytes and 86 per cent blastocytes. On December 12 the hemoglobin was 11.4 Gms. and the white count 5,800; December 13, hemoglobin of 11.1 Gms. with white count of 2,700 with 3 neutrophils, 25 lymphocytes and 71 per cent blastocytes and a platelet count of 1,000.

Hospital Course • The patient's history and the clinical findings suggested leukemia, with the white count indicating an acute blastic type probably of a monocytic series. The patient was given cortisone, and Purinethol plus prophylactic antibiotic therapy in the form of penicillin and chloromycetin. His condition deteriorated rapidly even with the transfusion of fresh whole blood. December 14 the patient expired.

Comment • It was not apparent that the patient was suffering from acute monocytic leukemia when he first reported to the clinic for treatment. The periodontal infection resulted from lowered resistance of the tissues infiltrated by leukemia and the debris-filled pocket, a condition which was apparently tolerated in health and which was the first clinical sign of leukemia. It is interesting to note that the curettage and antibiotic therapy alleviated the periodontal infection, thus preventing a more severe cellulitis and making the patient that much more comfortable prior to death.

CASE 2

This patient, a 22 year old white man in Korea, in July 1954 noted fatigue and anorexia. Two weeks from onset, jaundice was noted as well as burning of the left eye. Because of the symptoms' persistence, the patient reported for medical attention September 4, at which time he was found to be anemic. He was given two transfusions. A diagnosis of acute lymphatic leukemia was made on the basis of a peripheral smear which showed 33,000 to 45,000 white blood cells with 90 per cent lymphocytes and an average hemoglobin of 5. On arriving in Washington September 14 the patient was given three additional transfusions and transferred to Walter Reed Army Hospital. The patient's only complaint on admission was extreme soreness of the mouth and occasional hematemesis. His weight had

dropped from 184 to 169 pounds since the onset of the illness. The patient's history was noncontributory, but the family history was positive for cancer in the grandfather and diabetes in the grandmother.

Physical Examination • Initial examination showed the patient's weight was 166 pounds; blood pressure 140/60; height 5 feet 9 inches; hypertrophy of the gingiva with exceptional elongation of the interdental papillae in the lower anterior region; poor oral hygiene; slight scleral jaundice as well as jaundice of the mucosa and skin with chest and cardiovascular system normal and spleen nonpalpable. There were moderate macular papulopustular lesions of the neck and scattered diffusely over the back and buttocks. Full-mouth roentgenographic examination revealed a generalized slight-to-moderate recession of the crest of the alveolar process, with severe bone loss and heavy calculus deposits in the lower anterior region.

Laboratory Data • The laboratory report follows: initially, the hemoglobin averaged 6.5 Gms.; white blood cells, 30,000 to 50,000; hematocrit, 20; platelets adequate. During the hospital course, the patient's hemoglobin reached a high of 13 Gms. during October, but during November and subsequent months it averaged between 6 and 8 Gms.; at times decreasing to a low of 4 to 4.5 Gms. The total white blood count varied from 30,000 to 50,000 until mid-October, at which time it began rising to reach a level of 70,000 to 90,000. In October while the patient was on treatment, the white blood count dropped suddenly to levels of 500 to 2,000. Platelets averaged 110,000 during September and October. In November and December the white blood count stayed at about 2,000, the hemoglobin at 5 Gms. In January the white blood count dropped to 350, platelets to 10,000 and the hemoglobin to 4.2 Gms.

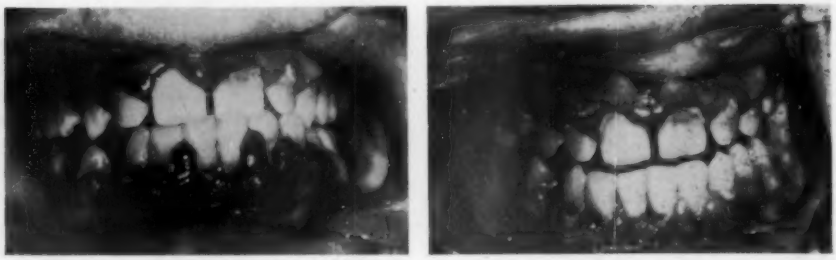
Hospital Course • During the period of hospitalization the patient never experienced a remission of his disease. Treatment consisted of intermittent blood transfusions, cortisone and Purinethol for the systemic condition and a conservative regime of oral prophylaxis by superficial curettage for the improvement of the painful gingival hypertrophy. This latter treatment was given beginning October 11, and the condition was considerably alleviated within several days.

The study of the morphologic picture by the hematology department resulted in a diagnosis of acute monocytic leukemia. Clinically, the patient remained extremely ill and toxic throughout his entire hospital course, frequently appearing moribund. During the last week of hospitalization he had two episodes of peripheral vascular collapse, with blood pressure dropping to levels of 80 or 60/0 and resulting in death January 21, 1955.

Comment • The patient's chief complaint during hospitalization was of painful, hypertrophied gingiva which interfered with mastication. This condition was most pronounced in the lower anterior region, which exhibited local irritating factors such as deep periodontal pockets and heavy deposits of calculus (illustration, left). By carefully removing the calculus and generally improving the oral hygiene, the patient was given a great deal of relief from oral pain and discomfort. The interdental papillae in the lower anterior receded (illustration, right) since most of the gingival enlargement was of an inflammatory nature and not solely because of the infiltration of leukemia.

SUMMARY

Leukemia, especially in the acute form, may affect the tissues in and around the oral cavity early in the course of the disease and prompt the patient to go to a dentist. A review of 99 instances of leu-



Left: Close-up of oral cavity of patient with acute monocytic leukemia described in Case 2, clearly revealing inflammation and hypertrophy in lower anterior region. Right: Appearance of oral cavity in Case 2 several days after institution of dental treatment

kemia at Walter Reed Army Hospital revealed that 55 per cent of the patients with acute leukemia revealed definite oral symptomatology at the entrance physical examination. Only 15 per cent of patients with chronic leukemia were so affected.

The dentist should be aware of the general and oral manifestations of this disease, and therefore able to recognize or suspect it in patients coming for examination and treatment. A careful and detailed history, evaluation of the blood and differential counts, and a consultation with an internist are essential for the confirmation or denial of a diagnosis of leukemia.

Often the oral lesions encountered in leukemia are aggravated by local factors superimposed on tissues infiltrated with leukemia. These regions can become extremely painful and are frequently the patient's chief complaint during hospitalization. Careful correction of the local conditions, plus improvement of the oral hygiene, can effect great improvement of the oral condition and make the patient considerably more comfortable. Even though the victims of this disease face death in a matter of days, weeks, or months, it is the responsibility of the dental profession to help them however and whenever possible.

Grandeur of Diminutiveness • To the eyes of philosophers and scientists, a curve drawn on a piece of paper two inches long is just as magnificent, just as symbolic of divine mysteries and melodies, as when embodied in the span of some cathedral roof. *Charles Kingsley. The World We Make.*

Characteristics of ultrasonic vibrations

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Ultrasonic vibrations are mechanical vibrations of the same type as sound waves but in a frequency range above that audible to the human ear. The lowest frequency in this range is often taken as 20 kilocycles per second (kcps), which corresponds to a wavelength of about 8 inches in solids, 2.4 inches in ordinary liquids and 0.63 inch in gases.[1] The wave form can be of several types, the most common of which are longitudinal, in which the particle displacement is in the direction of wave propagation, and transverse or shear, in which particle displacement is at right angles to the direction of wave propagation. Longitudinal waves involve changes in both the shape and the volume of the material as they pass through or propagate. Transverse waves involve changes in shape only.

The motion of the particles and the direction of the waves for longitudinal and shear waves are shown diagrammatically in the illustration.

METHODS OF GENERATING ULTRASONIC WAVES

Early Methods • In 1899 König[2] showed that ultrasonic waves may be produced in air by means of small tuning forks with frequencies up to about 90 kc, but the waves so produced are strongly damped and of such small energy that they are not practical for use. The Galton whistle, designed by Edelmann[3] in 1900, produced vibrations of fairly constant amplitude and frequency up to about 100 kc. Holtzmann[4] in 1925 described a generator based on longitudinal vibration of a glass or metal rod which produced frequencies of 33 kc and waves with more than 100 times the power of the Galton whistle. Hartmann[5-8] in 1922-1936 developed gas-current generators that produced vibrations up to about 500 kc, with sound energy up to about 50 watts. Many other investigators made technical contributions, such as the thermal generators, but recently magnetostrictive and piezoelectric generators have displaced the other types of generators for most purposes.

Piezoelectric Method • The piezoelectric effect was discovered by the Curie brothers[9] in 1880. They showed that certain crystals develop an electric charge

Chief, dental research section, National Bureau of Standards.

1. Carlin, Benson. Ultrasonics. New York, McGraw-Hill Book Co., Inc., 1949.

2. König, R. Ueber die höchsten hörbaren und unhörbaren Töne von $c^6 = 4096$ Schwingungen ($u\eta = 8192$ vs), bis über $f^{9}(f_{511})$, zu 90,000 Schwingungen (180,000 vs), nebst Bemerkungen über die Stasstöne ihrer Intervalle, und die durch sie erzeugten Kundt'schen Staubfiguren. Ann. Physik, Leipzig, Series 3, 69:626, 721 1899.

3. Edelmann, M. Th. Studien über die Erzeugung sehr hoher Töne vermittels der Galtonpfeife (Grenzpfeife). Ann. Physik, Leipzig, Series 4, 2:469 1900.

4. Holtzmann, M. Eine mächtige Quelle kurzer Schallwellen. Physikalische Zschr. 26:147 Jan. 15, 1925.

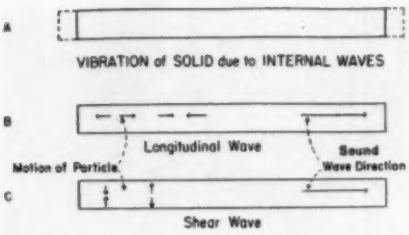
5. Hartmann, J. On the production of acoustic waves by means of an air-jet of a velocity exceeding that of sound. Philosophical Mag., London, Series 7, 11:926 April 31, 1931.

6. Hartmann, J. A new method for the generation of sound-waves. Phys. Rev., Series 2, 20:719 1922.

7. Hartmann, J. La génératice acoustique à jet d' air. Moyen de production d'ondes sonores de haute frequence et de grande intensité dans l' air. J. physique et radium, Series 7, 7:49 1936.

8. Hartmann, J., and Trolle, B. A new acoustic generator. The air-jet generator. J. Scient. Instruments. 4:101 Jan. 1927.

9. Curie, J., and Curie, P. Sur l'électricité polaire dans les cristaux hémièdres à faces enclinées. Compt. rend. Acad. sc., Paris 91:383 1880.



Diagrammatic representation of motion generated by a sound wave moving in a solid medium

when they are subjected to mechanical pressure or tension. The charge was shown to be in proportion to the pressure, and the sign was reversed when the mechanical stress was changed from compression to tension. Change in dimension of the crystal can be produced conversely by application of an electrical charge to the crystal. This effect has been observed in many crystals, such as quartz, Rochelle salt and barium titanate. Crystals are cut in a very definite way so that the surfaces will be in proper relation to the geometry of the crystal.

When a quartz plate is placed between electrodes connected to a source of alternating current, the quartz will be compressed in one half of the cycle and expanded an equal amount in the other half. The quartz will be set into elastic oscillation of the same period as the field. The maximum amplitude will be obtained when the electric frequency is the same as the natural mechanical frequency of the plate. Such crystals are used for accurate frequency standards.

Magnetostrictive Method • The magnetostrictive effect was discovered by Joule[10] in 1847. It is based essentially on the ability of a magnetic field to change the size of ferromagnetic materials, such as nickel, iron and some special alloys. If a rod of this type of material is brought into a magnetic field parallel to its length, the length will be changed a small amount. The length will be increased or decreased depending on the nature of the material, previous treatment, degree of magnetization and temperature. The fractional change in length is of the order of a few parts per million. Thus, a driving or oscillating mechanism can be produced by introducing a rod of suitable material and form into an alternating magnetic field.

In practice, a variable magnetic field is superimposed on a fixed field of much greater magnitude, resulting in an alternating elongation and compression of the rod about an equilibrium value. When the natural frequency of the rod and the frequency of the alternating current are the same, the amplitude of the oscillations will be maximum. The field required to produce the magnetostrictive effect can be generated in a simple coil. The field strength will be proportional to the number of turns per unit of length and to the current passing through the coil.

The application of the magnetic field may be likened to the application of a load to a mechanical spring. In one instance, the stiffness of the spring opposes the force applied by the load; in the other instance, stiffness of the ferromagnetic material opposes the force applied by the magnetic field. The relation between the mechanical deformation and magnetization is a result of the effect of the elastic stress on the microscopic units (domains) of the material. The addition of all these small strains produces a change in the length of the rod.

The strain ($\Delta L/L$) as a function of the field strength in rods was shown by Hueter and Bolt.[11] For nickel and an alloy composed of about 80 per cent nickel and 20 per cent iron (Permalloy), the change in length is independent of

10. Joule, J. P. On the effects of magnetism upon the dimensions of iron and steel bars. Philosophical Mag., London, Series 3, 30:76 Feb. 1847.

11. Hueter, T. F., and Bolt, R. H. Sonics. New York, John Wiley and Sons, 1955.

the direction of the applied field. Nickel contracts when subjected to increasing magnetization whereas Permalloy expands in approximately the same ratio (25 to 30 $\times$ 10^{-6} for a magnetic field strength of 2,000 ampere turns per meter).

CAVITATION IN LIQUIDS

When a liquid is exposed to intense sound vibrations, small bubbles are usually formed. This process is called cavitation. Most liquids, unless they are specially treated, contain dissolved or entrained gas. The amount of the gas entrained will depend on the temperature of the liquid, and, in general, the gas will be finely dispersed. These gas bubbles determine the tensile strength of the liquid, as they can be considered weak points in the liquid structure. The effect of impurities also is to form weak points in the structure of the liquid. When sound waves in a liquid are intense enough to produce pressure amplitudes greater than the hydrostatic pressure, a negative pressure exists during the dilatational phase.

Hueter and Bolt[11] state that several investigators have reported a wide range of rupture thresholds for water, from 1 to 100 atmospheres for different conditions and degrees of contamination. Van der Waal's equation indicates that the cohesive forces within liquids are large, of the order of 1,000 atmospheres in pure water. It has been reported that cavitation probably has three different aspects: (1) quiet degassing, (2) linear resonance of gas bubbles and (3) nonlinear collapse of vapor bubbles. All these require the presence of small, usually invisible, gas bubbles in the liquid. The larger the bubble the easier it is to produce cavitation.

Cavitation is closely associated with many of the most practical uses of sonic energy for industrial application. Many uses for ultrasonic apparatus have been found in biochemical and physicochemical laboratories for such applications as homogenization, dispersion, emulsification, separation of enzymes and vaccines for cell aggregates and depolymerization of high polymers. Industrial applications of some magnitude, those for cleaning small parts, such as ball bearings, lenses, shaving heads for electric razors, valves, small screws and other precision products, have been developed. The liquids used for sonic cleaning must dissolve the grease or detergent and also must have properties favorable to cavitation. Not only are grease, dirt and grinding particles removed, but cavitation action is powerful enough to remove oxide scales from some metals.

CUTTING INSTRUMENTS

The principle of vibrating solid rods by sound waves has been used for the development of tools for drilling, cutting and shaping materials. This class of instruments includes those designed for preparing tooth cavities. They are powered usually by magnetostrictive generators, which are the most practical source of energy in the frequency range of 10 to 60 kcps. Most dental instruments are in the 20 to 30 kcps frequency range. The relatively simple designs and large amplitudes of vibrations are important factors in the selection of the magnetostrictive-type drivers.

It is essential to design the power generators and the rod to conform to the physics of this type of motion. This means that correct relationships must exist between the physical sizes of the components of the device and the wavelength of the sound in order to produce effective results.

In the dental instruments, the vibrating rod carries a cutting tool, which, with the use of an abrasive slurry, cuts a hole in the tooth with an action like that of a trip hammer. The particles of abrasive are pounded against the object to be cut many thousands of times per second,

chipping off microscopic pieces. It is necessary to adjust the static pressure of the vibrating tool so that too much damping is not produced, in other words so that a small average contact pressure is maintained but damping is not sufficient to prevent the surface vibration. The cutting tip must be securely fastened to the vibrating element to prevent loosening.

Holes of any desired shape can be made by use of the proper cutting tool. The amplitude of vibration of the tool is increased by tapering the magnetostrictive rod at the end of the tool.

SUMMARY

Ultrasonic vibrations are sound waves of frequencies above the audible range. They are subject to the same general physical laws as ordinary sound. Their high frequency and short wavelength make them capable of many uses that depend on the transmission of energy and on directional control of this transmission. The most useful sources of high frequency waves are based on the well-established piezoelectric and magnetostrictive effects or, more simply, on the relationship between electric or magnetic fields and dimensional changes in certain materials. Many industrial and medical applications for this form of energy transfer have been developed. The application for cutting of tooth structure involves, in general, a trip-hammer mechanism, whereby the vibration of a tool removes microscopic pieces of tooth structure when an abrasive is pounded against the tooth at a rate of many thousand times a second.

Practical applications of photography in office use

Jack D. Carr, D.D.S., M.S., Indianapolis

The dental profession has entered a period of unequaled technological advance in all scientific fields. As a result, it has become increasingly difficult to explain highly technical procedures with words alone. Descriptive terms not only fail to convey certain ideas quickly, but may also lack the power to define a variation of degree which could be all-important to the proper understanding of a given situation.

Visual education is the obvious answer to the problem of explaining these technicalities to patients who expect detailed descriptions of dental work in a manner they can understand. It is important to convey descriptions accurately to colleagues and students as well as to refresh personal memories concerning the details of certain conditions.

The dental profession in the past has used visual aids such as diagrams, models and pictures for student and patient education, but photography, as a medium for

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transmitting ideas, has not been utilized to its greatest extent by many dentists.

CLASSIFICATION OF USES

The use of photography in the dental office may be divided into the following three general classes, depending on the manner in which it is utilized: (1) treatment planning, (2) records and (3) education of the patient.

Treatment planning is the phase of practice in which the dentist may use photography as an aid to his study of anticipated procedures. For this purpose photography is particularly useful in orthodontics, prosthodontics, facial surgery and mouth rehabilitation. For some time orthodontists have used photography in method planning to great advantage. Their employment of profile photographs in conjunction with roentgenograms and models is a procedure which can be used by any dentist who deals with changes in facial dimensions. The leisurely study of these photographs may be of help when consulting other dentists, and may be all-important in describing the degree of facial development. Study of photographs is vital in plastic surgery, especially in accident cases.

Photographs used in treatment planning automatically become part of the record file and are important in that they protect the dentist; they may also be of value to the patient who has been legally involved as an accident victim. Photographs of models and records are valuable because they are easily filed without taking up excessive storage space. Most important is the fact that these records become a source of material for patient education and teaching.

Education of the patient is by far the largest and most difficult of the classifications of uses of photography. Technical explanations must be made to individuals who are not equipped with the basic scientific knowledge to understand the subject involved.

It is becoming evident that dental health education has brought attention to children's dentistry so that dentists are seeing young patients in greater numbers and at an earlier age. It is gratifying to have these preschool patients; however, their limited vocabulary and inability to understand makes the education of this group most difficult. An interest must be created and descriptive terms kept at the child's level; therefore, for them, visual materials are invaluable. Good use can be made of the fact that cartoons are fascinating to children and, by incorporating dental educational materials in animated slides or movies, a proper learning atmosphere can be created.

PRIMARY EDUCATION

For the education of young patients there is so much outstanding material prepared by specialists and commercial firms that it is not practical for the average dentist to make his own. For use in primary dental education, the American Dental Association's Film Library has a fine selection of movies, film strips and 2 by 2 slides for rent or sale. The movies are not adaptable for use in most offices but if there is space enough for projection there are numerous cartoon-type of movies such as "Winky the Watchman," "Teeth Are To Keep" and "Swab Your Choppers." These films deliver a definite and understandable educational message to children.

The best medium for using visual aids seems to be the 2 by 2 color slides because they can be used with an inexpensive hand viewer, a table viewer or a slide projector. Slide series such as "The Little Pigs" teach good dental health habits and are most convenient because they have a phonograph record explanation to accompany them. An assistant or hygienist can show the series while the patient is waiting for the dentist (Fig. 1).

Another series, "How the Royal Family Learned to be Happy," is a fairy tale

Fig. 1 • Projection of educational cartoons

which does much to allay the patient's fears as he comes to understand the reasons for dental health measures. Children automatically become better patients as they learn dental terminology, and their ego is raised when the dentist takes time to explain things to them.

There are other selections covering a great variety of subjects which are suitable for showing to all groups; however, as the problems of operative dentistry in young patients are approached, the importance of each dentist's taking some of his own photographs to fit the particular needs of his individual practice is recognized.

It is not implied that photography can take the place of basic models but, after the patient has acquired a proper understanding of terminology and anatomy, photographs can carry on the educational programs most efficiently.

Young children enjoy seeing pictures of their own teeth, their roentgenograms, profile pictures and the "before and after" pictures of their own dental operations. As operative procedures are explained to children it is wise to have the parents present. The child may confide to his parents that he does not quite understand the explanation, whereas he might hesitate to do so to the dentist. The parents also may learn something new, or at least refresh their memory on the subject. The presence of the parents often helps to condition the child for future dental service.

It is only natural for children to develop a dislike for, or fear of, orthodontics after they have seen the bands and headcaps of their friends. Before and after pictures are an effective aid in overcoming these anxieties, and are the basis for the full presentation of facts to the parents.

Teen-agers need constant reminding of mouth hygiene and dietary factors. Such reminding should be a part of the school health program. If the school does not assume that responsibility, the dentist must do so. Teen-agers enjoy a movie such as "Swab Your Choppers," and they may be interested in slides of the American Dental Association's series "X-rays and Your Teeth."

In the author's practice, there are seven young adults with permanent dentitions who have caries-free mouths. Photographs such as those in Figure 2 and roentgenograms of these perfect mouths are a constant source of interest and inspiration to all, and the pride exhibited by these patients is reflected by their continued good care of their mouths. Pictures of these perfect mouths help to prove the importance of periodic dental prophylaxis and fluoride treatments. Pictures illustrating the periodic progress of children are invaluable in showing the parents that the time and money involved in dentistry are worthwhile. The spectacular change in facial contour and the pleasing appearance of the teeth is especially impressive to the orthodontic patient and his parents.

ADULT EDUCATION

Adult education is more difficult because it involves so many more phases of dentistry. At one extreme, practitioners are confronted with busy adults who are im-

patient with explanations unless short and to the point. Some patients do not want to be bothered with details; they indicate their profound confidence in their dentist and want to abide by his decision as to the best course of treatment. The other extreme is the patient who wants a post-graduate course on each new procedure. Dentists must be prepared for both types as well as for all the various types in between.

The American Dental Association's Film Library has a few movies and some slides which illustrate adult problems. The newest, entitled "Do It Yourself," concerns periodontal problems and can be used effectively by most dentists. For the casually interested patient, a few well-selected slides may suffice, but the entire series covers the subject very well.

The series of slides on "Occlusions and Malocclusions" contains 31 color slides, and describes this subject far more effectively than could the average dentist with numerous models and hours of time. One distinct advantage of using slides is that they can be adapted to the individual dentist's method of presenting visual materials. Some prefer a hand viewer at the chair (Fig. 3), whereas others like the table viewer used in a consultation room (Fig. 4); still others prefer a projector type of presentation. Unlike movies, the slide series type of presentation can be divided, shortened or selected for an individual need.

It should always be remembered that the patient's memory and retention of detail may not be sufficient for an accurate comparison between the original condition and that shown in the final picture; therefore, whenever possible, the before and after pictures should be viewed at the same time. This may be accomplished by using a slide in each of two hand viewers, by mounting a portion of two pictures on one slide, by mounting two or more 2 by 2 pictures on a 3¼ by 4

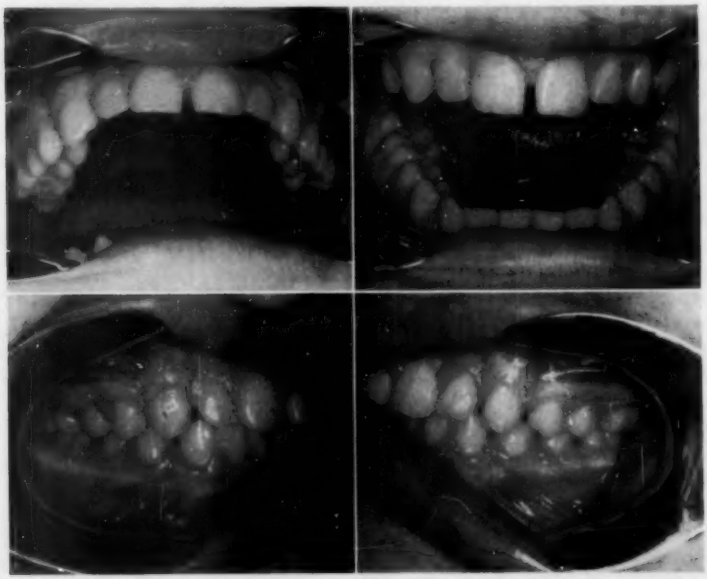

Fig. 2 • Caries-free permanent dentition

Fig. 3 • Use of hand viewer at the chair

slide, or by the projection of two separate slides from two projectors at the same time.

In a profession which has so many individualists, it would be impossible for the American Dental Association to present all of the technics used, so dentists must make some of their own visual educational materials. This gives the dentist an opportunity to impress patients two different ways. First his photographic ability and his skill in coordinating photography with dentistry may stimulate greater confidence on the part of the patient. Second, the showing of before and after pictures of a former patient who had a dental problem of a similar nature will increase the patient's confidence, particularly if the pictures show the manner in which the problem was solved.

The results of mandibular ostectomies cannot be described by words alone; a few pictures will make a vivid impression. G. T. Gregory of Indianapolis compiles a folder for each ostectomy. In this folder are color photographs and black and white pictures of models. The patients are proud of these folders and are pleased to have other people see the results. This is a fine example of how photographic prints can be used.

Photographs of fixed bridgework are important in the field of visual education because what dentists mean by a little gold showing around the abutment or pontic of the bridge may seem to be an exorbitant amount to the patient. If the patient is prepared for the result, there is seldom any disappointment after the work is completed.

Mouth rehabilitation can be presented in an impressive manner by a series of slides which end with a final picture of a beautiful result. This method is far more convincing than any verbal description.

PRESENTATION ART

Just as the technics of traditional education contrast with the most extreme progressive educational methods, so will the presentation of these visual materials vary with the individual dentist. Certain basic rules, however, should be observed.

1. The photographs or projections should be large enough that the patient does not have to guess or imagine what is being described. Small photographs, un-

Fig. 4 • Table viewer in consultation room

enlarged slides and roentgenograms cannot be interpreted by the untrained eye of the layman.

2. Whenever possible, there should be only one center of interest in the visual material. Confusing backgrounds, unrelated dental work, or facial disfigurements distract the patient and destroy the effectiveness of the presentation. To remove any doubt about the point of interest, the picture should be masked, retouched or have an arrow pointing to the important area.

3. Where the degree of difference is important, simultaneous showing of slides will provide better comparison.

4. Proper chronology in presentation of visual materials is essential for the proper understanding by patients.

5. Lengthy presentations should not be forced on disinterested patients; however, it is well to try again with a different approach or different materials at some later date.

For the advanced dentist-photographer the new magnetic sound movie projector has many possibilities for the dental profession. With this 16 mm. projector, practitioners can make their own movies and record a personal narration on the magnetic tape of the film. Automatic slide projectors coupled with tape recorders are already being used by some dentists. Certain applications of three-dimensional photography have a definite value in dentistry because of the sense of depth these pictures afford.

Of prime importance is the careful filming and cataloguing of slides so that they are available at a moment's notice for the hygienist, the assistant, or the dentist to use either as a series or as one appropriate, selected slide. Unless visual material is always conveniently available for use in a minimum of time, it cannot become an integral part of the office procedure.

SUMMARY

Fear harbored by the patient is still one of the serious problems of dentistry. This psychological block to cooperation can be overcome best by complete and easily understood explanations.

The ability of the dentist to describe anatomy and dental procedures is commensurate with his ability to transmit this technical knowledge to the patient. Dentists have difficulty in describing various degrees of conditions to each other, yet ask the untrained eye of the layman to see that certain tissues are irritated or that the difference in shadows on a roentgenogram indicates a cavity. Since photography, especially color photography, is a superior method of increasing communication between a dentist and his patient, dentists cannot afford to neglect this aid to treatment planning, record keeping and education of the patient.

907 Hume Mansur Building

Cave Men of the Future • We are the cave men of the world of the future, fumbling our way amid dangers of our own creation and destruction. *James T. Shotwell. Lesson on Security and Disarmament.*

Naval dental needs and treatment

Louis P. Hellman, B.S., M.A.; William E. Ludwick,† D.D.S., and Benjamin W. Oesterling,‡ D.M.D., Washington, D. C.*

The most important part of an effective Navy is the health of the men and women who constitute its personnel. The well-being of these individuals is vital to national security in time of peace or war. To minimize the noneffectiveness of active-duty naval personnel caused by oral disorders, an active program of individual oral hygiene and dental treatment is stressed, especially during the period of basic recruit training. (Naval personnel refers to all the active-duty members of both the Navy and the Marine Corps.) Every effort is made to treat and correct those dental diseases and conditions which may interfere with the performance of duties. To assure effectiveness of naval personnel, treatment must be carried out prior to the completion of recruit training and before the men are assigned to ships, stations or field activities where dental facilities may not be readily available. Unfortunately, the complete dental treatment needs of naval personnel far exceed the treatment capacities of the Naval Dental Corps.

This article presents a résumé of the activities of the Naval Dental Corps and provides information concerning the tremendous professional workload and related responsibilities that must be carried in attempting to achieve maximum oral health for all naval personnel. In order to provide a clear picture of the over-all dental problem, the following specific items will be discussed: (1) the accumulated dental needs of naval personnel that exist on their entering the Navy and the amount of treatment received during the basic training period to correct these defects, (2) the nonrecruit dental needs, (3) dental conditions at the time of separation, (4) dental facilities and personnel available to provide the treatment, and (5) the total treatment procedures accomplished for naval personnel during a one year period.

BACKGROUND INFORMATION

The problems confronting the Naval Dental Corps have changed substantially during the past 30 years. In order to understand better the current problems, some background information is presented.

As far back as 1922 the American Dental Association recognized the ratio of dental officers to troop strength (1 to 1,000) as totally inadequate. Beginning in that year the Association constantly supported legislation favoring an increase in this ratio. In 1935 legislation was

The opinions or assertions contained in this article are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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passed that established the present ratio of 2 dental officers per 1,000 troops. Without the strong support of the Association it is doubtful whether this change would have been accomplished. This legislation was recommended and became law during the time when the minimum dental requirements for entrance into the Navy and Marine Corps were 20 vital serviceable permanent teeth, including four opposed molars, two of which were directly opposed on each side of the dental arch, and four directly opposed incisors. A serviceable tooth was defined as one which was fully effective functionally, was free from advanced disease, was adequately supported by normal tissues, and did not have a faulty restoration or faulty crown or bridge attachment. With these enlistment standards, dental officers were able to maintain high standards of oral health, since annual maintenance care was the major treatment requirement. Annual maintenance care is defined as the amount of treatment required to correct the dental defects accruing in one year.

It was recognized by 1941 that the high medical and dental physical standards for enlistment would have to be lowered if the United States was to acquire sufficient personnel to maintain an effective fighting force. Just before Pearl Harbor, in the period from November 1940 through September 1941, dental defects led the causes of rejection among Selective Service registrants, accounting for over 250,000 of the 1,600,000 rejections for physical and mental reasons.[1] As a consequence, early in World War II dental standards were lowered until they were practically nonexistent. For service entrance, an applicant had only to be free of gross dental infection and have a minimum requirement of an edentulous upper jaw or an edentulous jaw corrected or correctable by complete denture. These standards are in effect at the present time, and it is unlikely that they will be raised.

RECRUIT DENTAL NEEDS AND TREATMENT

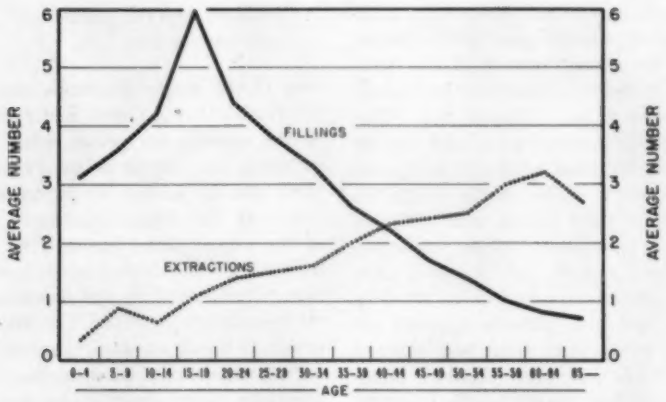
One of the major problems confronting the Naval Dental Corps is the treatment of the recruit, the person who has just enlisted. The recruit is usually in the 17 to 19 year age group. To realize the magnitude of the dental treatment problem of the recruits, one has only to refer to data on civilian dental needs based on a survey conducted by the American Dental Association in 1952.[2] The illustration, which is based on data obtained in this survey, shows that those in the 15 to 19 year age group needed an average of 6.0 fillings per person. This was considerably more than the needs for any other age group. Thus, it is significant that the age group in the civilian population requiring the most fillings includes the age group from which most Navy and Marine Corps recruits are drawn.

During the period January 1, 1956, to December 31, 1956, a survey was made of the 183,000 recruits who entered the Navy and the Marine Corps during that year. The average age of this group was 18.5 years; about 98 per cent were males. This survey recorded the dental needs of each recruit and the treatment received. These recruits started their naval careers at one of the following locations: the naval training centers: Bainbridge, Md., Great Lakes, Ill., or San Diego, Calif.; or the Marine Corps recruit depots: Parris Island, S. C., or San Diego, Calif.

Shortly after the arrival of the recruits, dental examinations were made, including posterior bitewing roentgenograms. The oral conditions existing prior to enlistment were recorded under four select-

1. Edwards, T. I.; McGill, K. H., and Rowntree, L. G. Causes of rejection and incidence of defects; local board examinations of selected registrants in peacetime; an analysis of reports of physical examination from 21 selected states. Medical Statistics Bul. no. 2. Washington, D. C., U. S. Selective Service System, 1943.

2. Moen, B. D. Survey of needs for dental care. II. Dental needs according to age and sex of patients. J.A.D.A. 46:200 Feb. 1953.



Average number of fillings and extractions required by white males, by age, 1952. Data from Moen[2]

ed categories of treatment needs. Ninety per cent of the recruits required fillings, 31 per cent required extraction of one or more teeth, about 7 per cent needed some form of periodontal or gingival treatment, and 5 per cent required either complete or partial dentures to restore an extensive loss of masticatory function. Only one out of every ten required no dental care. Table 1 shows the recruit dental needs and treatment received while in recruit training. Fillings accounted for most of the treatment time, although only a fourth of the needs for fillings could be taken care of during the recruit training period. It will be noted further that there were more extractions carried out than were indicated on the initial examination. This can be accounted for by pointing out that some of the carious teeth which were at first considered restorable ultimately had to be extracted. Periodontal conditions and prosthodontic considerations also accounted for additional extractions. The number of dentures constructed to restore extensive loss of masticatory function approximated the requirement. It should be noted in Table 1 that some recruits required more than one denture. About 1 in every 15 recruits required periodontal (including gingival) treatments. Only 1 in every 20 recruits, however, received any periodontal treatment. This indicates that their needs in this category were not met.

Although recruits accounted for only 5 per cent of the average daily strength of the Navy and Marine Corps during the period January 1, 1956, to December 31, 1956, recruits received about 15 per cent of the total treatment procedures rendered to Navy and Marine Corps personnel. This is all the more significant when it is realized that these defects were only partially corrected, as shown in Table 1.

NONRECRUIT NEEDS

About 85 per cent of the treatments carried out by the Naval Dental Corps are for nonrecruit personnel. As data on the dental needs of these personnel are not available, the treatments cannot be evaluated in terms of the needs of the nonrecruit population. The needs of this group are comprised of the untreated carious lesions existing prior to enlistment which could not be corrected during basic training and those dental defects which ac-

Table 1 • Recruit dental needs and treatment received at Navy and Marine Corps recruit training activities: calendar year 1956

Dental treatment	% of recruits requiring treatments	Number of treatments per 100 recruits	
		Needed	Received
Fillings	90.3	615.7	163.9
Extractions	31.0	81.5	100.3
Periodontics*	6.8	‡	5.1
Dentures†	5.3	6.7	6.6

*Includes gingival treatments.
†To restore extensive loss of masticatory function.
‡Data not available.

crue annually. Some insight as to the nature of the accomplishments of the Naval Dental Corps, however, can be obtained from data on the dental defects observed on separation from the service.

DENTAL CONDITIONS ON SEPARATION

Table 2 shows the distribution of dental needs among 5,000 separatees. It is significant that almost 90 per cent of all naval personnel are in need of some dental care at the time of separation, which is an indication that complete dental treatment was not afforded them while in the service. Of every 100 persons being separated, however, only about 3 can be considered in need of immediate care. In other words, the Naval Dental Corps was able to correct most of those defects which might have interfered with duties.

Table 2 • Percentage distribution of dental treatment required in 5,000 members of the Navy and Marine Corps on separation*

Treatment required	%
No treatment	12.2
Routine, but not early treatment	64.8
Early treatment of extensive conditions	20.3
Prosthetic appliances, immediate care	2.5
Emergency treatment, immediate care	0.2
Total	100.0

*Based on a special study conducted by the Bureau of Medicine and Surgery.

DENTAL FACILITIES AND PERSONNEL

There are over 450 naval dental facilities scattered throughout the world. They vary from a one chair dental operatory to clinics having from 60 to 70 chairs in the larger units. In the larger treatment facilities, prosthetic services are available. Dental treatment is also made available to personnel in many isolated units by mobile dental units.

On December 31, 1956, 1,789 dentists were in the Navy. In addition, there were 70 Medical Service Corps and Dental Service warrant officers and 3,212 dental technicians, who assist dental officers.

Table 3 • Dental officers on active duty with the U. S. Navy: December 31, 1956

Status, assignment or location	Dental officers	%
Status		
Regular	855	48
Reserve	934	52
Assignment		
Patient care	1,666	93
Other duties	123	7
Location		
Continental United States	1,257	70
Fleet and overseas	532	30
Total	1,789	100

These dental personnel served about 875,000 persons on active duty with the Navy and Marine Corps throughout the world. Thus, for every 1,000 persons in the Navy and Marine Corps, there were 2.0 dentists and 3.7 dental technicians. The distribution of the dental personnel is shown in Table 3. Five of every ten dental officers were reserves on active duty.

It will be noticed also that 1,666, or 93 per cent, of the dental officers were assigned to the care of patients. Of the 123 dental officers not assigned to care for patients, 71, or about 4 per cent, of those in the Dental Corps were enrolled

Table 4 • Dental treatments and adjunct service performed at all naval ships and stations by type of beneficiary: calendar year 1956

Category of dental treatment or adjunct service	Total	Personnel on active duty		Dependents	Others*
		Navy and Marine Corps	Army and Air Force		
TREATMENT	4,130,905	4,023,612	34,621	48,088	24,584
Operative dentistry	3,062,475	2,997,847	23,584	31,888	9,156
Periodontics	495,736	482,473	5,168	4,737	3,358
Oral surgery	494,153	469,781	5,046	11,087	8,239
Prosthodontics	78,541	73,511	823	376	3,831
ADJUNCT SERVICE	3,576,568	3,385,453	31,775	88,822	70,518
Roentgenography	1,805,941	1,699,894	12,758	59,543	33,746
Examinations	1,531,292	1,463,085	12,312	23,618	32,277
Postoperative care	239,335	222,474	6,705	5,661	4,495

*Includes retired military personnel for the most part.

for postgraduate instruction. Staffs of schools for dental technicians and dental officers accounted for another 25. The remaining 27 were assigned to research and development and administration.

Naval dental officers are distributed throughout the world, with about 70 per cent of the total dental officer complement being assigned to dental facilities in the United States. The remaining dental officers are attached to ships of the fleet or are in noncontinental areas, such as Pearl Harbor, Naples, Japan and the Philippines.

TREATMENTS CARRIED OUT

From Table 4 it may be seen that in the calendar year 1956 the Naval Dental Corps gave over 4,130,000 treatments and about 3,600,000 adjunct services, such as roentgenographic studies and examination. The largest number of treatments were in the category of operative dentistry, with 3,100,000 treatments; about 70 per cent of these were restorations, and the rest consisted mostly of temporary fillings and intermediate bases. Thus, the principal emphasis in naval dentistry is on the restoration of teeth. Periodontics was next in importance, with approximately 496,000 treatments, almost half of which were dental prophylaxis. Oral surgery, consisting mostly of extractions, follows, with approximately 494,000 treatments. Prosthodontic treatments, as would be expected, were the least numerous of all the treatments in the various categories, with about 79,000 treatments during this period.

Active-duty personnel are the recipients of about 98 per cent of all dental care. Dependents receive emergency dental care in naval facilities, principally for humanitarian purposes. They also receive care for dental conditions which require hospitalization. As can be seen from Table 4, dependents receive 1 per cent or less of the treatments in the categories of operative dentistry, periodontics and prosthodontics. Dependents account for about 2 per cent of the treatments in the category of oral surgery. The largest number of treatments received by dependents was in the service category of roentgenography. More than three fourths of the treatments received by dependents were given in areas outside the continental limits of the United States where civilian dental care was not available.

Beneficiaries in the "other" category, shown in Table 4, consist mostly of retired military personnel whose dental

needs differ noticeably from active duty personnel. This accounts for the relatively high proportion of oral surgery and prosthodontic treatments for this group. Similar to the dependents, the largest number of dental treatments received by retired personnel are in the category of roentgenography, with examinations next in order of frequency.

DISCUSSION

The lowering of dental standards had a profound effect on the characteristics of naval dentistry. When prewar dental standards were in effect, the problem was chiefly one of maintenance and prevention. Since standards have been lowered, the Naval Dental Corps has been faced with a tide of recruits who require extensive treatment before they can be sent to isolated areas and small ships.

An analysis of this increased work load reveals a number of differences between civilian and naval dentistry. The average civilian dentist builds through the years a practice consisting of all age groups. His practice stabilizes and is composed more or less of permanent patients on whom he does the initial dental treatment and then maintains their oral health. In contrast, the Naval Dental Corps is faced with a constantly changing population composed primarily of persons in the age group which has the greatest requirement for operative restorations. In addition to this difference, almost 50 per cent of the officers in the Naval Dental Corps are reserve officers. This means that, over a period of two years, 50 per cent of naval dental officers leave the service and most will be replaced by recently graduated dentists. The time and effort spent in indoctrinating these dentists cannot yield a proportionate return. About the time the reserve dental officer achieves professional proficiency in the Navy he is ready to return to civilian life. Time must be taken then to indoctrinate and assign new reserve officers.

CONCLUSIONS

The efforts of the Naval Dental Corps are directed toward maintaining the oral health of the Navy and Marine Corps personnel at a level which will result in a minimum of time lost from duty. From a survey of the dental needs of naval personnel and treatments given, the following conclusions can be drawn:

1. With the present ratio of dental officers in the Navy and the present standards, the total dental needs of personnel on active duty cannot be met.
2. An average of 616 fillings are needed for every 100 recruits who enter the Navy and Marine Corps; however, only a fourth of this number are actually provided.
3. Almost 90 per cent of the personnel leaving the Navy and Marine Corps are in need of dental treatment.
4. Military personnel on active duty are the recipients of 98 per cent of the treatments provided by the Naval Dental Corps.

ADDENDUM

The policy of the Navy with respect to dental treatment for dependents has been changed by Congress since this paper was written. The Dependents' Medical Care Act, which became effective December 7, 1956, authorizes routine dental care for dependents of military personnel outside the continental limits of the United States and in remote areas within the continental limits of the United States where adequate civilian dental facilities are not available.

Efficient appointment scheduling

Robert N. Tanis, D.D.S., M.S.D., Chicago

The need for practicing dentistry more efficiently has been noted during the past decade. In fact, dental groups have included on their programs more speakers on practice administration and related subjects.

One significant contribution to practice administration was made in 1951 when a group composed both of faculty members of the W. A. Kellogg Foundation Institute for Graduate and Postgraduate Dentistry of the University of Michigan and of private practitioners agreed that a complete study in this field was necessary. By 1953 two years of planning had resulted in a week of intensive study and discussion in what is now known as the Michigan Practice Administration Workshop.[1] When persons skilled and successful in teaching and private practice give their time and report their observations, it is a sign that problems in practice administration are important.

EFFICIENCY BEGINS WITH THE DENTIST

The first factor in efficient appointment scheduling begins with the interest of the dentist. He will be more interested in efficiency when he merely considers costs of a decade ago and compares them to costs of today. What has the dentist done about the increased costs of operating the dental office?

Many dentists have failed to raise their fees in proportion to their increased costs in dental practice and daily living: hence the need for increased production, more efficient practice administration, or both. It is evident that the cost of nonefficient methods is prohibitive, and to ignore this is to invite disaster into the dental office.[2]

The dentist must be the initiating force behind efficient appointment scheduling. The appointment book is the guide to efficient scheduling.

THE APPOINTMENT BOOK

Authorities of practice administration agree that the appointment book must be set up months in advance around a "skeleton matrix."

A "skeleton matrix" is an expression coined by the author to describe the supporting structure on which the functioning matrix, known as the appointment book, is built. In other words, a skeleton matrix establishes a pattern on which the operator's productive time is efficiently regulated according to long, short or "flash" appointments, and on which the "cushion periods" and office holidays are effectively blocked off over a period of six months in advance.

This skeleton matrix has several advantages: first, it lays the foundation for a high degree of efficiency and production; second, it offers proper understanding of office policies, and last, it allows

1. Mann, William R., and Easlick, Kenneth A. Practice administration for the dentist. St. Louis, C. V. Mosby Co., 1955.
2. Kendall, C. H. Mind your own business; practice management, that is. Illinois D.J. 20:483 Nov. 1951.

sufficient time for cushion periods. The skeleton matrix can be employed with gratifying results by every dental office, regardless of the size of the office.

At all times the appointment book should carry a page for each day of the succeeding six calendar months, and each day's page should be marked off according to the pattern set up on the skeleton matrix. On the fifteenth of each month the secretary adds to the last page of the appointment book another month of appointment sheets, each sheet marked off according to the pattern.

Actually, in multiple-chair offices employing a hygienist, appointments for dental work will not be given beyond six or seven weeks in advance.[3] When there is no hygienist, however, it becomes necessary for the dentist to have appointments for recalls made in advance, hence a combination dentist-hygienist appointment book to include all types of service is necessary.

A guide for a workable skeleton matrix is given. It must be remembered that the matrix is set up for six months plus, in advance, not just for the succeeding few weeks.

The dentist begins by marking off the days his office will not be open. It is not efficient to have to cancel appointments because the dentist has forgotten he will be out of the office.

The average dental office is open five days each week, and closed two. These two days are marked off. There is a growing fondness, especially on the part of the dentist's employees, for having these two days in sequence; for example, Saturday and Sunday, or Sunday and Monday, which enables the staff to be more rested and relaxed after a two-day holiday and ultimately more efficient on the job. This procedure is contrary to that in the majority of dental offices where Sunday and Wednesday are the days off.

Next the customary holidays are eliminated. Often a holiday falls so that the staff can take advantage of a long week end. These short vacations should be anticipated and indicated on the appointment book well in advance of their occurrence.

Dentists who like their hunting and fishing know a year in advance the opening days and the best time for their individual sports. These days can be noted in the appointment book.

Dental society meetings, study club meetings and conventions, as well as other chosen organizational affairs, are indicated in the book.

Next, attention is turned to working days.

Often the dentist is heard to complain that his appointment book is bulging with appointments months in advance, and he finds that these demands are breaking him. Much too often the patient complains that he has been going to the dentist for months and is discouraged by the length of time he must wait between his appointments.

What appears to be the usual problem for every busy dentist can easily be eliminated merely by introducing an efficient matrix schedule in his appointment books. New patients and overflow patients can be placed on a "call list." As a patient's dental work is completed and his name eliminated from the appointment book, a new patient from the call list is selected and placed into the appointment schedule.

One half-day cushion period within every five-day work week, such as Thursday afternoons, should be provided for.[3] These cushion periods might be used for certain emergency patients and patients given preference from the call list.

The efficient assistant or secretary should record lost time on the patient's record in the following instances: (1) broken appointments for which a charge should be made in certain instances if sufficient notice of inability to keep

3. Woehler, John L. Personal communication.

appointments is not given and (2) a changed appointment by the patient who persists in changing appointments, even if sufficient notice is given. These changes should be noted on the patient's record and underlined in red to call attention to the number of past changes in the schedule made by the patient. This will enable the alert secretary to decide what course to take in future scheduling with this patient. Those who break appointments repeatedly are not given a reappointment time, but are asked to call in later, or they are charged for the time, or appointments are made for them sufficiently far in advance to discourage them gradually from coming to the office. This procedure definitely will bring about an improvement in the number of broken and changed appointments in the dental office.

The secretary also should record changed appointments made by the office in instances where the doctor is ill or the patient's laboratory work has not been completed. In this way the secretary will not cancel appointments with the patient who previously has had his appointment changed by the office several times.

The secretary should keep at her finger tips a list of patients who are available for dental appointments on short notice and, also, the particular time of day they can be called in. This is called the "available list." An office employee available during her lunch hour, a teacher available after school and a house-wife available while her children are in school can be put on this list. The list must be kept current. Patients are added to the list as they come into the office for dental treatment. Patients are dropped from the list after they have been called a time or two and have not been able to substitute for altered appointments.

THE DAILY PLANS

The daily plans are important in the efficient appointment scheduling program in a busy dental practice, and call for certain methods to be followed.

First, the morning hours are reserved mainly for longer appointments, younger children and all difficult dental problems.

Second, the afternoons are reserved for the daily one-hour cushion periods, shorter appointments and easier treatment.

Factors in daily planning of the appointment book will show that long appointments should be used where indicated, and shorter or routine appointments as necessary, whereas little or no reservation of time would be used in flash appointments, such as appointments for irrigation or removal of sutures when second or third operating rooms are available. These flash appointments usually are grouped together and finished daily at one time such as three or four flash appointments during the latter one half of the afternoon cushion hour.[3]

Many authorities agree that the daily cushion hour should immediately follow the noon hour. This has significant value for the doctor. On days when unforeseen problems cause his morning appointments to extend into the noon hour, he need not sacrifice his lunch and midday rest period, for he can utilize a portion of the cushion hour.

In making appointments for the cushion hour, the secretary always schedules the latter part of the hour first, working forward to the beginning of the hour.

The cushion hour is an essential part of the efficiently planned day for several reasons. It provides the dentist with a definite time for treating emergency toothaches without jeopardizing his appointments with his previously scheduled patients; it provides time for checking on laboratory work in progress, and it provides time for attending to the various office problems which arise during the day.

Individual doctors may find the need to vary the outlined daily schedule according to their physiological and psycho-

logical characteristics. Many men find that they accomplish their best quality work and the greatest quantity of work in the morning hours, with a gradual slackening as the afternoon progresses. However, there are those persons who feel efficient appointment scheduling can best be accomplished with a slower, more gradual start in the morning, and by taking their heavier cases in the afternoon. These are factors for personal consideration.

Daily planning is greatly facilitated by knowing how much time to allocate to a specific operation. This information is readily available by using a stop watch and by recording accurately how much time is required to perform a given operative procedure.

The stop watch serves a dual purpose. It also records as lost time the motion dentists spend in admitting patients into the operating rooms themselves, discussing problems their assistants can handle, and dismissing patients personally. Keeping track of lost time for a designated period becomes immensely valuable when the lost time is figured cumulatively for the day, for the week and finally for the month. In many instances the accumulated loss represents the time gain desired for practice, either by providing the time, without extending the workday, for an additional patient to increase income; or by making it possible to leave the office at an earlier hour. This may explain why some practices apparently allow the doctor more outside leisure hours.

It is suggested that each operator in the office have an appointment book. This book can be the loose-leaf type which contains pages for any number of months in advance, or a bound type (such as the American Dental Association appointment book) which is printed and made available to the dentist at least six months in advance.[4]

One appointment book will suffice for the one and two-chair offices with the dentist as the only operator, whereas two appointment books naturally would be used for the three and four-chair offices involving a dentist and a hygienist, or perhaps a dentist and an associate dentist. For the office with a dentist, associate dentist and hygienist, it would follow that the use of three separate appointment books would be the most efficient.

By employing individual books in a multiple-operator office, a dentist almost instantly can have access to his appointment book for rearranging appointments for his patients or for whatever his need may be. Likewise, the hygienist or the secretary is able to make the hygienist's appointments or to work on the hygienist's recall program without involving the books of the other operators.

I have found in a multiple-operator office that the main disadvantage of using separate appointment books revolves around the books' being carried off to the various operating rooms and forgotten. This annoyance can be overcome, however, by providing in the business office a definite place for each appointment book and by making it a steadfast rule that the book be returned immediately when not in use. In this way the appointment books usually are instantly available to the staff member needing them.

It is readily evident that the major disadvantage of one master book for multiple-operator offices is its lack of sufficient space for recording information, as well as its inflexibility when it is in demand by two or more operators at the same time.

PERSONNEL NEEDED

Another factor needed to handle efficient appointment scheduling is the employment of intelligent, well-trained, dentistry-minded personnel.[5]

4. Kirby, Wallace N. Personal communication.

5. Coomer, O. B. Roll of auxiliary personnel in augmenting services of the dentist. J.A.D.A. 52:442 April 1956.

In the smaller offices the dental assistant is a Jack-of-all-trades; one of her duties is that of appointment manager.[6] On the other hand, in the larger offices the dental assistant's place in booking appointments is taken by the secretary, which enables the dental assistant to become a true chair assistant. The secretary in this office develops into an efficient appointment scheduler and also manager of an efficient business office.[7]

As the larger dental office supporting the dentist, the associate dentist and the hygienist grows, it finds that in addition to the dental assistant and secretary, it can also support a receptionist who can assume many of the lesser business office duties.[7] Thus, the secretary is permitted more time to manage the office, to develop a true skeleton matrix with scheduled appointments, and to attend to the more important business office duties. In other words, the former secretary begins to fill more of an executory type of position.[5]

It is possible to employ adequate personnel to take care of the business side of dentistry where dentistry is trying to do a quality and quantity type service, hence paying for today's increased office expense.

TELEPHONE AND DOOR

The first contact with the dentist usually is made by phone or door. This first contact is extremely important, not only from the standpoint of having the secretary or receptionist pleasantly greet the patient, but also from the standpoint of having the secretary gain pertinent information for the dentist.

The secretary should be given a carefully planned series of questions to help her secure the desired data concerning the identity of the patient.[8] Following a similar plan, the hygienist, after her contact with the patient, will also contribute identification data to the patient's record. This information is valuable to the dentist, for it enables him to greet the patient and please him with his personal interest, as well as to help the dentist classify the type of dental work he may educate the patient to selecting. This procedure of obtaining information may be used by the smaller offices with just the assistant, although less effectively.

The secretary and the hygienist in their initial contact with the patient conveniently can incorporate into the conversation the office policies to which the patient is expected to conform.

Hence, with the office having obtained identification data on the patient, and with the patient having been educated to office policies, a clear-cut beginning of efficient appointment scheduling has been initiated.[5]

THE RECALL

Efficient appointment scheduling assists in building an effective recall program.[4]

Before dismissing the patient on completion of his dental work, the secretary arranges a recall appointment at a time up to six months in the future. This appointment is confirmed by the secretary with the patient personally one week prior to its fulfillment date, usually by telephone.[9]

The cooperative patient seldom is allowed to leave the dental office without an appointment, whether the appointment is one month in advance to observe healing, three months in advance for periodontal conditions, or six months in advance for prophylaxis recall. This shows the necessity for carrying a skeleton matrix on the appointment book for six months to a year in advance.

6. Card, P. W. Dentist and his assistant. J.A.D.A. 52:580 May 1956.

7. Blass, J. L., and Tulkin, Irvin. Successful dental practice. Philadelphia, J. B. Lippincott Co., 1947.

8. Morrison, G. Archanna. In the dentist's office, a guide for auxiliary dental personnel. Philadelphia, J. B. Lippincott Co., 1948.

9. Abbeloff, A. J. Dental practice management. New York D. J. 17:367 Oct. 1951.

DISCUSSION AND SUMMARY

It is necessary today more than ever before to practice all phases of dentistry efficiently. The resultant saving of time enables the dentist to reach his maximum goal in patient load at an earlier professional age, and to render better quality dental service to more people. The resulting impact of efficient appointment scheduling plays an important role in the dental office.

The dentist, by setting his own policies in his office, is instrumental in attracting a practice and is the main force in holding it together. The dentist must be interested in modern practice administration policies if he wishes to do better than average, and he must be able to transfer successfully this interest in policies to the personnel in his office. The dentist, therefore, is the principal motivating influence on his own future success.

The appointment book must receive serious attention both by the dentist and by his staff, if quality service and above average remuneration is the goal. This goal is more easily reached if a skeleton matrix of daily planning for six months or more in advance can be introduced into the appointment book, and the dental staff made cognizant of the value of the dentist's operating time.

The daily plans call for a program which, while varying to a degree, essentially is efficient, and is intentionally scheduled and planned according to an accepted routine. This procedure turns the disconcerted, rushed type of practice into an enjoyable, well-organized professional adventure. The daily planned schedule provokes favorable comment from the professional clientele, as well as more pleasant employee-employer relationships.

The personnel needed to perform efficient appointment scheduling may vary according to the size of the dental office. Essentially the dentist must train one person thoroughly and allow her the responsibility for making a skeleton matrix around which a good appointment book may be built. This individual should be fully aware of all existing office policies. Multiple-chair offices would include the receptionist, secretary and hygienist as responsible parties in establishing an efficient functioning appointment book or books.

Contacts with the patient influence the efficient appointment scheduling. Identification data, carefully collected in the beginning appointments, enables a psychological plan of the patient's case. All dentists need to give their secretaries a few well-chosen, prearranged questions and answers, thereby enabling her to be properly and professionally alert.

The recall procedure should enable the dentist to offer a checkup appointment two, four or six months in advance. These prearranged appointments should be kept at all costs by the dental office through advanced scheduling in the skeleton matrix.

701 West 111th Street

Evaluating New Theories • When evaluating a new theory, a scientist attempts to divorce himself from prejudice and to test the various facets of the theory against the facts in his possession. He asks himself: "What does the theory explain? What is left unexplained? Does the theory contradict reputable observations?" *Harrison Brown.*

A courageous lady—
Mrs. Henry Wadsworth Longfellow

Herschel H. Reynolds, D.D.S., Detroit

In 1846, on the sixteenth day of October, a Boston dentist, William Thomas Green Morton, successfully demonstrated and announced to the world the anesthetic property of ether. On April 7, 1847, a Boston dentist, Nathan Cooley Keep, administered the vapor of ether to lighten the ordeal of childbirth. Never before had he used it in like circumstances and never before in the western world had it been used for this purpose. Horace Wells, a Hartford, Connecticut dentist, had made these historic events possible. He had conceived the principle of anesthesia by inhalation and, on December 11, 1844, had demonstrated the anesthetic property of nitrous oxide gas.

Historians have given credit to those pioneers in anesthesia, but they have only mentioned the lady to whom ether was first administered during childbirth. The events meant more than the elimination of pain; they show the courage of men and women to take the drug before its comparative safety had been proved.

The purpose of this article is to give credit to the lady to whom Dr. Keep had reference in the following letter which he published in the *Boston Medical and Surgical Journal* for April 14, 1847:

Dear Sir,

On the 7th inst., I administered the vapor of ether in a case of natural labor. . . .

From the commencement of inhalation to the close of labor, thirty minutes. Number of inhalations, five. No unpleasant symptoms occured and the result was highly satisfactory.

Yours &c,
N. C. Keep

Boston
April 10, 1847.

Remarkable indeed was the man whose signature was attached to the preceding letter. Dr. Keep is listed as a surgeon dentist in the Boston Directory for 1846-1847. He received his practical training from John Randall. In 1827, he graduated from the Harvard Medical School. History tells us that he acquired the medical degree purely as an aid to a more intelligent practice of dentistry.

Dr. Keep was the witness for the prosecution who gave conclusive testimony in the famous Webster-Parkman murder trial.[1] John White Webster was a professor of chemistry in the Harvard Medical School. George Parkman was a physician who rarely practiced his profession. He was a merchant at heart and had amassed a large fortune. He made a loan to Webster which the latter was unable to repay, and Parkman's nagging was responsible for his own death.

Dr. Keep fitted piece by piece the broken fragments of a denture on a cast which he had saved after restoring Parkman's missing teeth. Thus he proved the

1. Amory, Cleveland. The proper Bostonians. New York, E. P. Dutton & Co., Inc., 1947, p. 207-227.

identity of the remains in question. It is said that he burst into tears when it became necessary for him to give the testimony that sent Webster to the gallows. Important as was the role that the gentle Dr. Keep played in the trial, it was entirely foreign to his nature. Surely, he was much happier experimenting with the use of ether as an anesthetic and the making of porcelain teeth, aiding in the formation of the Massachusetts Dental Society and serving as its first president and finally becoming the first dean of the Harvard University Dental School. He has left the dental profession an honored heritage.

During this period, Boston, Cambridge and Concord were the homes of such brilliant men as Emerson, Thoreau, Alcott, Lowell, Holmes, Hawthorne, Longfellow, Mann and many others. Many of them kept journals, and some mentioned the practice of medicine and dentistry, including the employment of ether and the controversy over its use as an anesthetic. A search through many of these diaries has failed to throw any light on Dr. Keep's somewhat cryptic letter. It was Henry Wadsworth Longfellow's journal that finally led to a complete revelation of the facts. The version of the journal published by Longfellow's brother Samuel recounts some of the poet's experiences with ether anesthesia.

Mr. Longfellow speaks of his dental ills many times, and on March 2, 1847, he mentions ether.[2]

> After the lecture went to a meeting of the American Academy at No. 39 [Mr. N. Appleton's, residence of Longfellow's father-in-law]. A long discussion about the great discovery of the age—the Nepenthe—sulphuric ether. Dr. Charles Jackson claims it; Dr. Morton, who first used it in extracting teeth, lays claim to the honor of a discoverer.

He went to Boston again on April 1. "Went to town for the first time in several weeks, and had a conversation with Dr. Keep about sulphuric ether and its use."[2]

The next entry in the journal was on April 7, 1847. It was only a short sentence. "This morning was born in the Craigie House [the Longfellow home in Cambridge] a girl, to the great joy of all."[3]

On April 8th, the poet writes:[4]

> Went to see Dr. Elliott about my eyes. Stepped into Dr. Keep's and had a double tooth extracted under the ethereal vapor. On inhaling it, I burst into fits of laughter. My brain whirled round, and I seemed to soar like a lark spirally into the air. I was conscious when he took the tooth out and cried out, as if from infinitely deep caverns, "Stop"; but I could not control my muscles or make any resistance, and out came the tooth without pain.

Samuel Longfellow may be suspected of having edited things out of his brother's journal. It was not until 1955 that Edward Wagenknecht told the whole story in his book *Longfellow: A Full-length Portrait*. Wagenknecht was given permission by the Longfellow trustees to quote freely from the original manuscript whatever he chose. The index of that work contains the entry "ether, use of, at Mrs. L's third confinement." "Mrs. L." was none other than Mrs. Henry Wadsworth Longfellow.

Longfellow is commonly known as a quiet, even timid, American poet who seldom wrote about practical things. This was true of him as a poet, but as a man he was very practical in most things. He and his wife pioneered in a field of medicine that has become a boon to mankind.

Mrs. Longfellow had longed for a little girl, but the circumstance of the birth of the child Fanny seemed for a time to be more important than her sex. The ladies of Cambridge were buzzing with

2. Life of Henry Wadsworth Longfellow with extracts from his journals and correspondence, edited by Samuel Longfellow. Boston, Ticknor and Co., 1886, vol. 2, p. 82.

3. Life of Henry Wadsworth Longfellow with extracts from his journals and correspondence, edited by Samuel Longfellow. Boston, Ticknor and Co., 1886, vol. 2, p. 85.

4. Life of Henry Wadsworth Longfellow with extracts from his journals and correspondence, edited by Samuel Longfellow. Boston, Ticknor and Co., 1886, vol. 2, p. 85-86.

excitement, but the only comments that can be found, except that of Mrs. Longfellow, came from men. "Longfellow showed much more courage in the administering of it," George Hillard, a friend of the family, is quoted as saying, "since it had not been applied before in such cases, and the physicians, whom he consulted, could not take the responsibility of advising it. The success of the experiment was perfect, and as you might well suppose, it has excited a 'furore' among the 'femmes couvertes' of our community. The curse of Eve is felt to have glanced aslope and fallen to the ground."

Lieber, another friend of the Longfellows, commented:[5]

> How could he know the ether would not stop the active energies of nature so indispensable during parturition? . . . I have no doubt whatever that some regulars will seriously object to this removal of Eve's curse, as they preached against vaccination—indeed far more so.

Mrs. Longfellow defended her action. In a letter to Mrs. Pierce (Longfellow's sister) she said:[5]

> I am very sorry you all thought me so rash and naughty in trying the ether. Henry's faith gave me courage and I had heard such a thing had succeeded abroad, where the surgeons extend the great blessing much more boldly and universally than our kind doctors. Two other ladies I know have followed my example successfully and I feel proud to be the pioneer to less suffering for poor weak womankind. This is certainly the greatest blessing of this age, and I am glad to have lived at the time of its coming, and in a country which gives it to the world. . . .

Alexander Longfellow, the poet's brother, quipped, "If you had asked your wife which she preferred, a boy or a girl, she would have replied, 'I will take ether.' "[5]

Merriment, however, was not for long. The little girl, so loved by her family, lived but a little over a year. (The circumstances of her birth did not cause her death.) This loss was the greatest sorrow Mrs. Longfellow was ever called on to endure. With the passage of time and the birth of three other daughters, "grave Alice, laughing Allegra and Edith with golden hair" as their father described them in a poem, happiness returned to the family. Life again was very kind to them. It is recorded that Oliver Wendell Holmes, passing the Craigie House, "trembled to look at it," feeling that "those who lived there had their happiness so perfect that no change . . . . could fail to be for the worse."[6]

The summer of 1861 the family remained in Cambridge because of the serious illness of Mr. Appleton. Tragedy struck quickly and without warning on July 9. Mrs. Longfellow was sitting in the draft of an open window sealing up in packages some locks of her two younger daughters' hair. She was wearing a light summer dress which was ignited by a match used in melting the sealing wax. She ran, frightened, to her husband in an adjacent room. He, too, was badly burned in extinguishing the flames.

Mrs. Longfellow suffered intensely and was put to sleep by the use of ether. In the night she awoke free from pain, but the next day fell into a coma from which there was no awaking. On her 18th wedding anniversary, July 13, she was buried at Mount Auburn.[7]

Misfortune had followed in the footsteps of the discoverers of anesthesia by inhalation, and twice misfortune had cast its dark shadow on the family who first used it in the field of obstetrics. By some strange twist of fate, those who did much to alleviate physical suffering suffered intensely—both in mind and in body.

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5. Wagenknecht, Edward. Longfellow: a full-length portrait. New York, Longmans, Green & Co., Inc., 1955, p. 243.

6. Wagenknecht, Edward. Longfellow: a full-length portrait. New York, Longmans, Green & Co., Inc., 1955, p. 253.

7. Wagenknecht, Edward. Longfellow: a full-length portrait. New York, Longmans, Green & Co., Inc., 1955, p. 252-253.

Dentistry's zone of silence

L. Walter Brown, Jr., D.M.D., Boston

People living in the Northwest, near Vancouver Island, speak of a stretch of water in the Pacific as the "zone of silence." No sound can be produced or transmitted there, and many ships have been wrecked because they could not be warned of dangerous reefs by bells or sirens.

Dentistry, too, has a hushed area, but this zone of silence is not a natural phenomenon. It was created by dentists who failed to tell patients of all the services dentistry has to offer. It is the purpose of this paper to bring this zone of silence into proper focus and to suggest how it may be broken in one particular field of dentistry, the field of crown and bridge prosthodontics.

The startling truth that the public is not being informed of dental services which can improve health, chewing efficiency and physical appearance was revealed in the author's observations of patients in clinics and in private practice; the evidence is the crippled dentition that these patients revealed on oral examination. Some of these patients were indigent, to be sure, but the greater percentage included medical and dental students and patients who were referred. When asked if they had ever been told that a certain treatment could be performed and would be beneficial, these patients generally replied: "My dentist never explained such possibilities to me."

What is the source of this unfortunate oversight? The individual dentist can be considered one possibility, organized dentistry a second, and the dental school a third.

RESPONSIBILITY OF THE DENTIST

The individual dentist is the closest link between the patient and dentistry; it is on him that the patient depends for relief from pain, routine reparative treatment and for counsel in the prevention of dental dysfunction. The title "Doctor" means "to teach," and the responsibility of instructing patients in ways of dental health falls on the dentist's shoulders. Education should be an integral part of his practice, and his program of instruction should include not only the necessary remedial services but a comprehensive analysis of the patient's needs to insure the longevity of his teeth and dental structures. The dentist must describe the benefits that will reward the patient who respects his advice and the evils that may punish those who ignore or neglect it.

Many patients appear with a preconceived idea of what they want from dentistry. Even before they can be asked, "What is troubling you?" they say that they want to have all their teeth out because they have had so much trouble with them and have spent a lot of money on them and want no more trouble and no more expense. Sometimes this is the correct solution for the patient demanding it, but more often it is not. If those patients are told what the dental profession can do for them and why it is not

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necessary to extract their teeth, they usually are happy to take the advice. The results satisfy the dentist as well as the patient.

Why has this "what's-the-use, let's-pull-all-my-teeth" attitude developed? Is it because the dentist has not educated his patients properly? If the dentist neglects this important duty because he is too busy or indifferent, he is as culpable of a professional misdemeanor as he would be if he extracted the wrong tooth.

The dentist might hesitate to explain the advantages of certain dental services because he is loath to try new methods and prefers to continue with the same procedures that he has used since he began his practice. It is imperative that every dentist keep pace with the advances within his own and related fields so that he can always give the best possible service.

Another excuse that the dentist may offer to explain his silence is the cost of various kinds of service. It is not for him to assume the position of deciding whether a patient can afford a service. Because of the dentist's training and experience, the patient will listen to his recommendations; but the decision to accept or not to accept the suggested treatment must be made by the patient alone.

No excuse or explanation can alter the fact that the dentist who fails to advise his patient properly has been remiss in his professional duty. The patient will not be the only one to suffer the consequences. At the moment, dental practices are reflecting the national prosperity. Dentists are busy. Not too long ago, however, many were sitting idle, reading dog-eared periodicals taken from reception room tables while they waited for patients. Had their patients been educated in regard to prospective dental needs, much of this wasted time might have been avoided.

Are the teeth of a human being less important than his car? It would seem so, because automobiles are getting far more attention than teeth. The automobile industry conducts never-ending campaigns in newspapers, on the radio and on television to teach the public that periodic checkups are important if their cars are to function efficiently and economically. Using the same media, the industry also spreads information about the improvements in new models, and the thoughts of making a change, of buying something new, are stimulated.

The dental profession deals with irreplaceable parts. It cannot substitute a new part for one that is worn or defective. Therefore, dentistry's thought is to preserve the vital organs that can be treated as long as possible. Only when that is no longer possible are substitutes resorted to, and these mechanical aids are prepared meticulously so that they will restore normal physiologic body activity.

Merely reciting the shortcomings in dentistry is not enough; there must be corrective measures that will put a stop to them. Such a program should begin with the dentist, himself, with a thorough soul-searching to determine if he has the skills necessary to perform the services about which he will inform his patient and a clear comprehension of what these services can mean to the patient's health. Should he discover that he lacks the knowledge or understanding, he must take steps to remedy the deficiency. In planning the educational presentation that will become an integral part of his work program, the dentist should devote as much appointment time as will be required to tell his complete story in a convincing manner. He may use specimens, charts, models and any other aids that will help to make his presentation as graphic as possible, for the proficiency with which he passes on his information will also imbue the patient with the dentist's enthusiasm and sincerity.

During this period of complete diagnosis, suggested treatment and explanation, the emphasis must be on the general health of the patient, not on the filling

of a gap or the placement of an appliance. Equal stress must be put on the preservation of the remaining dental structures as well as on the routine reparative and replacement procedures. At the conclusion of this presentation, the patient has a clear view of the situation, and will begin to think seriously of a way to fit the cost and time of the protracted schedule to his economic limits.

The manifold applications of crown and bridge prostheses range from a single tooth restoration to multiple replacements *per se* and include aids which are in the field of removable partial dentures—precision and clasp retained types—and in the field of successful periodontal therapy. The following list of suggestions has been drawn to demonstrate the variety of these applications and to indicate how dentistry's zone of silence may be destroyed.

Instead of placing a number of independent fillings in a tooth with several carious lesions, the dentist might suggest a full cast crown which is stronger, better able to restore tooth form and contour and a reliable protection against further decay. He might also suggest a full cast crown for a tooth with several fillings which might otherwise require extraction.

For the patient with a series of anterior teeth with multiple fillings, the dentist may advise a series of porcelain jacket crowns which will preserve his teeth for a longer period of time and look better.

Restorations that are soldered together and which thus prevent the development of periodontal troubles may be advised by the dentist to the patient who complains about food packing between certain teeth.

Where moderate periodontal conditions exist, the dentist can explain that a great many of these conditions can be treated successfully through occlusal equilibration, alone. If the periodontal condition is more involved, the patient might be told that the stresses and strains which may be causing this condition can be prevented and the longevity of his teeth assured through the use of full or partial crowns and their splinting.

When counseling a patient about the replacement of missing teeth, the dentist might suggest the fixed bridge because of its comfort and security, especially for those with a hazardous or artistic occupation. He may tell the patient that often, in making a replacement with a bridge, it is necessary to cut a perfectly sound tooth for its placement, experience having taught that in the long run such teeth will be more satisfactory abutments than previously filled teeth.[1] In the case of intermittent missing teeth, an explanation might be made that a series of fixed bridges will avoid the bulk of a removable partial denture. Orthodontic intervention may also correct a malposed or malrelated tooth and render it a useful abutment without risking its vitality.

Dentists should take the time to inform a patient that new materials are available and an unsightly and faulty anterior bridge can now be replaced with a more esthetic one made of acrylic resin in combination with a gold alloy. In order to achieve a more esthetic replacement, the dentist might recommend orthodontic treatment before placing a fixed bridge.

To those patients who are wearing or who require a removable partial denture, the dentist might offer the explanation that the intervention of a metallic restoration between the clasp and the tooth will insure it against further inroads of dental caries. The explanation might go a step further and add that through the medium of such a metal restoration the following factors may be satisfied: (1) it will permit the design of a rest of adequate size so that it will not be broken in function; (2) it will allow the design of the rest to transmit the forces of occlusion within the toleration limits of the tooth and the supporting structures, protecting the tooth from the forces which

1. Coelho, David H. Personal communication.

might loosen it or cause periodontal troubles to develop and (3) it is possible to reshape the tooth and get a more favorable clasp retention or, from an esthetic viewpoint, a more desirable clasp location.

To the patient who must lose some anterior teeth the dentist might say that with the use of the new self-curing resins, a temporary bridge can be ready for insertion immediately after extraction and thus save him the embarrassment of being seen without teeth or with a temporary partial denture. The counsel can be given others who may also have to face the loss of teeth that it would be wise to plan for their replacement promptly in order to avoid loss of function, collapsed occlusion or periodontal problems which might ensue.

Emphasis should be put on the fact that dental operations are being performed far more easily today because of the equipment and physical accessories obtainable. The encouragement given by the knowledge that there are local anesthetics and other drugs to minimize pain and drugs that will reduce apprehension with which the patients usually anticipate dental services will enhance a dentist's efforts toward improved dental health for his patients.[2]

This sample list of suggestions is sufficient to illustrate how the individual dentist can improve his services and educate his patients.

RESPONSIBILITY OF ORGANIZED DENTISTRY

An examination of organized dentistry does not reveal the glaring faults attributable to the individual dentist. Certain trends of organized dentistry may be considered, however, as indirect contributions.

A review of the programs of local, state and national dental organizations suggests that there may be as many styles in dentistry as in women's fashions. At present the center of the stage is held by the topic "oral rehabilitation" or "occlusal rehabilitation," and the type of treatment is featured with all the glamor of a Hollywood premiere. The author has no conflict with this treatment as long as it is presented and practiced as it was intended to be—for the fullest and best restoration of the individual's dentition and in the best interest of his general and dental health. Unfortunately, some have exploited the field for personal gains only, and patients who have endured the experience once soon learned that they would have to repeat it because the meticulous work had been attempted by dentists who did not have the necessary skill or comprehension.

Teachers in this field admit that many of their students are limited by an unsatisfactory background in such fundamentals as tooth morphology, basic principles of tooth preparation and of registering impressions. Yet if a dental organization sets up clinics on such apparently elementary topics, they are cancelled because of lack of interest. In sharp contrast is a recent experience where a speaker who was giving a detailed description of a maxillary first molar kept the rapt attention of his entire audience for more than an hour. The group was aware of the importance of this fundamental topic for the success of its specialty, and the speaker discussed his subject in a direct manner.

It would appear that fundamentals should receive greater emphasis when dental programs are being arranged.

RESPONSIBILITY OF THE DENTAL SCHOOL

The third and final possible source of dentistry's zone of silence is the dental school.

The real aim of education is to provide an understanding of the basic principles and to

2. Rane, Leo. Personal communication.

develop the ability to reason, think, and analyze in order that human knowledge may be broadened and solutions to problems may be found.[3]

If these are the objectives of education, dental or general, the individual dentist's education must assume part of the responsibility for his errors of omission.

Teachers in dental schools frequently observe that the dental student of today cannot write descriptively or discuss a patient's case with clarity and objectivity.[4] Granting that this is in part a reflection of faulty predental preparation, it must also be conceded that the tendency in dental schools to place too much emphasis on the true-false type of examination helps to keep the narrow bounds of the student's vision, and increases his inability to express his thoughts. With this type of examination, the teacher is able to cover a wider area in any given test, but the student is deprived of an opportunity to think in broad terms. The tendency of instructors to make a fetish of point requirements seems to imply that quantity rather than quality may be the dominating factor in dental school. When a student calls an instructor to grade a recently placed restoration and the instructor, after asking why it doesn't have a better polish receives the answer that the student is to have the tooth extracted, there is obviously either a misplaced emphasis, a misunderstanding, or both.

Within recent years the specialty board has entered the scene, but its impact on dental education is still too new to be evaluated properly. It is conceivable that the establishment of boards might bring about a revision of the pattern of teaching dentistry, might require a longer period of training or might bring about the further splintering of dentistry. Whatever effects the establishment of boards might have and whatever problems it might introduce, calm and sober judgment will be needed to furnish an unbiased opinion.

Years of teaching experience prompts the question whether or not it is possible that the efforts of the dental faculty to create a successful dentist have developed a form of teaching that puts too much emphasis on technical proficiency and too little on the human objective of treating patients as people. It could be that some subjects become more dominant than others because these are the subjects that interest an administrator. If either of these conditions prevail, it is easy to understand why dentists carry over these same tendencies into their professional life. As a widely known proverb states, "as the branch is bent so is the tree inclined."

CONCLUSION

The following quotation explains in a large measure why dentistry has a zone of silence:

> We in America have been concerned for some years with the lot of underprivileged people throughout the world. . . . We have more food than we can eat . . . we have bigger homes and bigger cars. . . . We have everything we need in fact except the most important thing of all . . . time to think and the habit of thought.[5]

The existence of the zone of silence has escaped the attention of the dental profession and no thought was given to it because of the hustle and bustle of everyday life. Now that its importance has been noted, the proper action should be taken.

136 Harrison Avenue

3. Jesness, Oscar B. Combating restrictions on freedom. In Social science and freedom, no. 8. Minneapolis, Social Science Research Center, Graduate School, University of Minnesota, 1955, p. 56.

4. Brown, L. Walter, Jr. Teaching-learning situation in crown and bridge prosthodontics. J. D. Educ. 20:236 May 1956.

5. Cousins, Norman. A thought on thinking. Freedom & Union 10:5 Oct. 1955.

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Editorials

Columnist's intemperate warning fans public's fear of x-radiation

Mr. Drew Pearson, the well known newspaper columnist, has recently elected to enter the field of medical writing. As a result countless readers of his syndicated column were unduly alarmed on October 12 by his ill-advised observations on the dangers of x-radiation.

"Thousands of people yearly," warns Mr. Pearson, "are needlessly injured by incorrect use of x-ray equipment. Worst offenders are dentists and general practitioners who can buy x-ray machines and fluoroscopes even though they lack special training in their use. . . . Dentists can avoid the reckless use of x-rays by probing for cavities, then x-raying only those teeth where definite cavities are suspected."

American dentists cannot be blamed for reacting violently to that and several other unsupported statements contained in the article. Principally, Mr. Pearson gives his readers some erroneous rule-of-thumb advice as to how to avoid overexposure to x-radiation. Such advice is typical of that of the layman unversed in the subject. Contrast the scare claims of Pearson with the calm statement of Peterson.[1]

"Oversimplification of the problem of ionizing radiation and the frightening of an entire population into panicky efforts to protect their 'genetic legacy' by covering over their gonads every time an x-ray film is taken is not only unjustifiable but also delusory.

"Likewise, to infer that if one adds the roentgens from successive radiographic examinations, treatments and accidental exposures, and that if this total exceeds a certain predetermined figure, life span will be shortened is an unproved assumption but one that has apparently, although erroneously, been attributed to the reports from the National Academy of Sciences."

Recent studies show clearly that, contrary to columnist Pearson's comments, the dangerous effects on the gonads caused by the taking of dental roentgenograms is exceedingly small. Richards[2] has recently stated:

"If 20 complete mouth periapical examinations of 14 exposures each were made of individuals during the first 30 years of their lives, the male gonads would receive about 0.3 r and the female gonads 0.05 r. These are very small amounts of additional radiation that reach the gonads when compared to the unavoidable exposure of between 4 r and 5 r that each person receives from background radiation in a 30 year period. Even so, in an effort to keep the expenditures of radiation as low as possible, those in dental roentgenography should review current methods and practices to see if the same result could be obtained with less radiation."

Roentgenographic examinations are essential in the diagnosis of dental disease. Their value far outweighs any possible deleterious effects. The potential harm is slight when a good diagnostic unit in the hands of a competent operator is used. Means of further reducing the amount of radiation to the patient are, in the average case, relatively simple. The use of proper filtration and other means of dose reduction are receiving increasing attention in dental roentgenography.

Dentists, like others in the healing arts, are cognizant of the fact that any amount of unnecessary radiation is too much. But where sound professional judgment indicates its use, roentgenograms should be taken without hesitation.

Dentistry regrets that Mr. Pearson, who enjoys a wide readership, cannot use his talents and the newspaper columns at his command to provide the public with accurate information on the diagnostic and therapeutic use of x-radiation rather than to harm some fear-susceptible readers by influencing them to abstain from needed roentgenographic examination or treatment.

1. Peterson, O. S., Jr. (M.D.) Radiation hazards. I. Radiation hazards in medical practice. New England J. Med. 257:756 Oct. 17, 1957.
2. Richards, Albert G. Roentgen-ray radiation and the dental patient. J.A.D.A. 54:476 April 1957.

Support for dental assistants

The American Dental Assistants Association, an organization dedicated to the advancement of one of dentistry's principal ancillary services, has recently announced a nation-wide membership campaign. Its purpose is twofold: to increase membership and to improve the proficiency of those serving in that vocation. The program, officially launched by Mary Frances Dutton, president of the American Dental Assistants Association, in an address to the House of Delegates of the American Dental Association on November 4, has the approval of the American Dental Association.

Accordingly every member of the American Dental Association soon will receive a request from President William R. Alstadt to encourage his office assistant to join the national organization for dental assistants and thus obtain the many advantages offered by that association.

The American Dental Assistants Association is to be commended on its great accomplishments during its first thirty-five years of existence. During that short period it has transformed an unorganized, almost unrecognized, group of dental ancillaries

into an important adjunctive dental service by raising the technical, educational and ethical level of its members.

Certain it is that the high degree of efficiency found among most members of the American Dental Assistants Association has contributed much to the increased efficiency of the offices in which they are engaged and to the increased respect accorded dentistry today by the general public. Few conscientious dentists today—no matter how great their skill and efficiency—could come anywhere near meeting the demands for their service without the assistance of an equally conscientious and efficient assistant.

Unfortunately there are some dentists who fail to comprehend the full worth of a competent assistant. Unfortunately, too, there appear to be too many dental assistants who fail to comprehend the vast potentials of their vocation—potentials which can become realizations if advantage is taken of the benefits offered by the American Dental Assistants Association. It is to these uninformed that President Alstadt makes his appeal.

The American Dental Assistants Association has a long record of service to the profession and is deserving of the full support of all dentists. The American Dental Association believes that there is a need for a strong active organization of dental assistants who serve as an important part of the dental health team.

The dentist, whose assistant is not a member of her national organization, owes it to himself, his office and his community to encourage her to join and to take advantage of the opportunities such membership affords. As the assistant increases her efficiency she increases the capacity of the dentist and the dental office with which she is associated to meet the growing demands for dental care.

The Twelfth International Dental Congress

The Twelfth International Dental Congress held in Rome September seventh to fourteenth probably surpassed in every respect the most optimistic expectations of its organizing committee. Sponsored jointly by the Fédération Dentaire Internationale and the Associazione Medici Dentisti Italiani, it drew some 10,000 dentists and associates from all parts of the world. Of that number nearly 1,000 came from America.

All who were privileged to attend are indebted to the officers, committeemen and others in an organizational capacity for the superiority of the meeting. Its setting was superb, its scientific session was excellent, the quality, quantity and presentation of its various types of exhibits were remarkable, and the hospitality and graciousness of the Italian dentists and their fellow countrymen left little wanting.

The Congress was fortunate in having at its disposal the postwar, ultramodern Italian Universal Exposition Center—E.U.R.—a project initiated by Mussolini but only now nearing completion. The spacious Palazzo dei Congressi, a dominant building on the exposition grounds, housed the general and scientific meetings of the Congress and the business meetings of the Fédération Dentaire Internationale. Interpreters, aided by the most modern electrical facilities, provided the audiences with simultaneous translations of the essays, reports and discussions, thus breaking down a speech barrier that otherwise would have been formidable.

American dentistry was privileged to contribute to the success of the Congress. Five members of the American Dental Association presented formal scientific reports, approximately one hundred and eighty others contributed projected, limited attendance or group clinics, and many were elected to honorary positions by the organizing committee of the Congress.

The caliber of the scientific program of the Congress was matched by the quality of its extracurricular events including a special operatic performance, a banquet, a ball, a reception at the United States Embassy in honor of the American Dental Association, a tea and fashion show for the ladies and a special audience with Pope Pius XII.

It requires a people with the imagination and artistic talent of the Italians to convert the ruins of an ancient Roman bath into a modern outdoor amphitheater. This the Italians have done with Emperor Caracalla's public baths built in 217 A.D. They have converted the lofty brick and stone walls of the long since decayed and discarded structure into the backdrop and wings of an enormous outdoor stage. And it was in this magnificent setting that Verdi's opera, Aida, was magnificently given. The banquet, the ball and the fashion show tea were presented in a continental manner and with a special Roman touch rarely, if ever, experienced in the western world. The reception at the United States Embassy provided a never to be forgotten social evening for which American dentistry and particularly the American Dental Association is honored and indebted.

On Sunday afternoon, September 8, thousands of dentists of all faiths and all countries, accompanied by their wives and associates, filled to capacity the enormous and famous Basilica of St. Peter's to hear a learned and sympathetic discussion of dentistry by H. H. Pope Pius XII and to receive his blessing.

The Twelfth International Dental Congress will be recorded as an outstanding achievement in the history of world dentistry. It will stand as a monument to the efficiency of the organization and program committees of the Fédération Dentaire Internationale and the Associazione Medici Dentisti Italiani which made it so. The Thirteenth Congress is scheduled to be held in Cologne, Germany, in 1962. Already the German Dental Association is preparing its plans for that occasion. Those in charge of the 1962 session will have much to do to equal the quality of the Congress just completed.

International Correspondence

NEWS FROM GREAT BRITAIN

A report from the dental health education committee of the General Dental Council summarizes the work of the dental board in the education of the public. After a detailed review of this work the report concludes as follows:

A variety of dental health material has already been produced and distributed in considerable quantities. The Council is aware, however, that the effectiveness of any propaganda lies in its continuous use and that concentrated effort is needed to dispel public apathy toward the principles and practice of oral hygiene. The Council's belief in the necessity of a national dental health campaign has been strengthened by the publication of the report of the McNair Committee. Should the Government decide to implement the report by setting up a standing committee to coordinate the work of educating the public in dental care and to initiate a widespread campaign, the Council is confident that its accumulation of experience and the wide variety of its productions will enable it to provide a unique contribution. Meanwhile, the Council is planning pilot schemes in selected areas which it hopes will provide valuable information on the effectiveness of its present productions and may well suggest what new material is needed. The organization of such schemes, moreover, even though on so small a scale, will be a guide to the conduct of more extensive campaigns. By such means, the Council believes that it may eventually justify the opinion of the committee responsible for the 1921 Act and that its propaganda may "affect very materially the health of the nation" which has for so long been jeopardized by dental neglect.

DENTAL EDUCATION

The September issue of the *British Dental Journal* is the annual education number and is well worth reading. There are three original communications: "Universities and Dental Education," by Professor H. F. Humphreys; "The Young Dental Teacher," by Professor Martin A. Rushton, and "Teaching the Teacher," by Dr. H. M. Pickard.

There is a thoughtful article on "Recruitment of Dental Teaching Staff" written by a prominent teacher.

There is a very interesting article by L. E. Claremont on "Observations on Forty Years in British Dentistry" which ends with the following paragraph:

"If we are really honest with ourselves, we must admit that whatever sins of omission or commission the British Dental Association commits, and however much the profession dislikes the Health Act, dentistry today offers a very fair income compared to other professions and the younger graduates who have not known the days of complete freedom have a safe future financially. They are starting their careers in the welfare state, which is bound to be full of regulations and frustrations unknown in the past. With all the difficulties that confront us today, let us go forward with stout hearts and back up the Association in all its many activities for all we are worth."

Finally, there is an educational supplement which includes "Directory of the Dental Schools and Examining Bodies," "Dominion Qualifications," a listing of those regulations recognized by the General Dental Council for admission to the Dentists Register, and "Higher Dental Degrees and Diplomas," a description of the functions of the dental postgraduate bureau and of the postgraduate instruction available at the Institute of Dental Surgery.

GENERAL DENTAL COUNCIL

Ancillary dental workers regulations made by the General Dental Council under section 18 of the Dentists' Act, 1956, which have been approved by the Privy Council, laid before Parliament and approved by a resolution of each House of Parliament, came into force on August 1, 1957. The immediate effect of these regulations is to establish a class of ancillary dental workers to be called dental hygienists. The General Dental Council will keep a roll of dental hygienists and persons entered in this roll will be permitted to carry out dental work of the following kinds under the direction of a registered dentist who has examined the patient and has indicated the course of treatment to be provided:

1. cleaning and polishing teeth;
2. scaling teeth (that is to say, the removal of tartar, deposits, accretions and stains from those parts of the surfaces of the teeth which are exposed or which are directly beneath the

free margins of the gums, including the application of medications appropriate thereto;)

3. the application to the teeth of solutions of sodium or stannous fluoride or such other similar prophylactic solutions as the Council may from time to time determine, and

4. giving advice within the meaning of subsection (2) of section 14 of the Dentists Act, 1921, on matters relating to oral hygiene.

Dental hygienists may be employed both in the national, or local authority health services and in general practice, but those employed in general practice are permitted to carry out dental work only under the direct personal supervision of a registered dentist.

Oral hygienists may continue to work in the national or local authority health services under arrangements made by the Ministry of Health without enrolling if they so wish, but only those persons whose names are entered in the roll of dental hygienists may work in general practice. Only enrolled hygienists are authorized to use the title "Dental Hygienist."

The major problem is to recruit the right persons for training as dental hygienists and then to find suitable places for training. This latter problem is difficult to solve.

BRITISH DENTAL ASSOCIATION

Early next year, a new Representative Board will take office for three years. The board meets four times a year to determine the policy of the Association. Members donate their time and receive only their travelling expenses and a subsistence allowance. The board is the parliament of the Association and any member may be nominated for election. Every member has a vote.

ITEMS OF INTEREST

The many friends of Professor A. C. W. Hutchinson will welcome the news that he had the honor of being invited to give the first G. V. Black Memorial Lecture at the Northwestern University Dental School in November, 1957.

The 78th Annual Conference of the British Dental Association will be held in Dundee from July 7 to 11, 1958. Arrangements are well in hand for a full program of meetings and social events. Visitors from the United States and Canada are always welcome at these annual conferences and further information will be published in the *British Dental Journal*.

It will interest readers to know that the correspondence in the *British Dental Journal* on the use of the honorary title of doctor shows little signs of abatement, indicating that the subject has considerable interest for the profession in Great Britain. The general trend of opinion seems to be that the status of dentist would be enhanced by the prefix "doctor."

Our congratulations to Surgeon Rear Admiral (D) C. J. Finnigan, who is the new Deputy Director-General for Dental Services in the Royal Navy, taking over from Surgeon Rear Admiral (D) L. B. Osborne, who has filled the post of Director with great distinction.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

WILLIAM R. ALSTADT INSTALLED AS PRESIDENT; PHILLIPS CHOSEN PRESIDENT-ELECT; BOARD UPHELD ON FTC RULES

William R. Alstadt, of Little Rock, Ark., 41, an orthodontist, was formally installed as president of the American Dental Association at the closing session of the 98th annual meeting, November 4-7, in the Fontainebleau Hotel, Miami Beach, Fla. The House of Delegates elected Percy T. Phillips, of New York City, president-elect. Dr. Alstadt is the youngest president in Association history, and Dr. Phillips is the first native New Yorker to be chosen president-elect.

Arthur W. Kellner, of Hollywood, Fla., was elected first vice-president. J. Murray Gavel, of Boston, was elected second vice-president, and B. F. Wilkinson, of Tyler, Tex., third vice-president.

Unanimously re-elected as speaker of the House was Gerald D. Timmons, of Philadelphia, dean of Temple University School of Dentistry.

The 416-member House of Delegates, representing 89,000 Association members, also elected the following four members of the Board of Trustees for three-year terms: Second District, Edward F. Mimmack, Buffalo, succeeding Dr. Phillips; Eleventh District, Fritz A. Pierson, Lincoln, Neb., succeeding C. S. Renouard; Twelfth District, John S. Eilar, Albuquerque, N. Mex., succeeding Harold M. Flickinger, and Thirteenth District, John R. Abel, succeeding himself.

The House worked through an enormous agenda in its four days and took many major actions designed to consolidate and advance the interests of dentistry in the coming period.

With 413 of its 416 members present, the House:

Approved the action of the Board of Trustees in accepting the *Trade Practice Rules for the Commercial Dental Laboratory Industry,* as amended June 14, 1957, with the letter dated July 10, 1957, from Paul M. Cameron, chief, Trade Practice Conference Division, Federal Trade Commission, as complying with the conditions established by the 1956 House of Delegates;

Approved a statement on *Requirements for the Approval of Education Programs for Dental Laboratory Technicians,* as prepared by the Council on Dental Education and amended by the Board of Trustees;

Resolved to ask Congress to augment the present research grants and training programs of the National Institute of Dental Research by increasing the annual appropriation by $1,000,000;

Directed the Board of Trustees to take immediate steps to secure, through regulations of the Defense Department or through enactment of laws by Congress, regulations or laws to restrict the establishment or continuation of clinics or facilities for the provision of dental care for the dependents of military personnel on military bases, unless provisions for such dental care meet the requirements of the Dependents' Medical Care Act, and that the Board report to the House of Delegates in 1958 on this matter;

Urged constituent societies to inform the Council on Dental Trade and Laboratory Relations of any apparent abuses of the amended *Trade Practice Rules;*

Endorsed the science fair movement and urged constituent and component dental societies to support projects and otherwise participate actively in science fairs at the community and state levels;

Approved in principle a proposal to develop a National Health Fair;

Requested the Council on Dental Education to try to increase the number of schools of dental hygiene;

Voted to request the federal and state governments to declare the payment of all dental and medical expenses as casualty losses and, as such, tax deductible;

Urged constituent societies to insure that Blue Shield plans in their respective states provide for direct payment to dentists for those procedures which may be performed legally by both physicians and dentists;

Instructed the Council on Dental Health and the Bureau of Economic Research and Statistics to study the factors which should be considered in determining the value of dental care and attempt to apply this information to the development of fees for dental care;

Instructed the Bureau of Public Information and the Bureau of Dental Health Education to study factors involved in developing a program of public education on a national level and report to the Board of Trustees and the 1958 House of Delegates;

Directed the American Dental Association to gather statistical information on the dental laboratory industry;

Recommended issuance of an Association *Information Bulletin* describing the dentist's legal and ethical responsibilities regarding his relation with the dental laboratory;

Directed the Council on Federal Dental Services to make an immediate study of the provision of dental care to dependents of military personnel on military installations by civilian dentists and to develop such policy recommendations as the Council deems necessary, for presentation to the 1958 House of Delegates;

Instructed the Council on Hospital Dental Service to seek official representation on the Joint Commission on Accreditation of Hospitals;

Approved continued membership of the Association in the American Thrift Assembly and requested the Board to increase the contribution to the Assembly to $7,500.

DENTAL LABORATORY RULES

The debate in the House over the Federal Trade Commission *Rules* was thorough and decisive. The Board of Trustees proposed that its report to the House on compliance with the directive on the *Trade Practice Rules* be presented the afternoon of November 4. The proposal for discussion on the first day was supported by Louis Brach, of Jersey City, N. J., spokesman for the so-called "Interstate Regional Committee on Prosthetic Service."

Dr. Abel, reporting for the Board of Trustees, declared that the decision of the Board to approve the FTC *Rules* and the Commission's letter as fulfilling the 1956 directive of the House was unanimous. The Board, stated the report, was convinced that it is not possible to secure revocation of the *Rules*, even if revocation were desirable, without the demonstration of substantive abuse of the *Rules* by commercial dental laboratories. Such demonstration of abuse, the Board's statement emphasized, must rest on a valid, legal basis and not on unsustained charges and suspicions, fear and conjecture.

"The Board of Trustees is not convinced of the truth of the assertion that most, or many, dental laboratories wish to engage in the illegal practice of dentistry," stated the Board. "This assertion is as absurd as the one that most, or many, dentists wish to engage in the illegal practice of medicine. The Board of Trustees believes there is a solid core of dental laboratory owners and dental laboratory technicians who are reputable businessmen with a stake in their industry and conscious of their obligations to serve only the dental profession. As witness of this statement, the Board of Trustees calls attention to the fact that in the effort to amend the *Trade Practice Rules*, the major amendments were supported by the National Association of Dental Laboratories."

The House of Delegates, asserted the

BOARD OF

Board of Trustees, officers and guests at the 98th annual session at Miami, (seated l. to r.): Gerald H. Leathermen, London, a guest of the Association; Lon W. Morrey, editor; John W. Knutson, third vice-president; William Alstadt, president-elect; Harry Lyons, president; Harold Hillenbrand, secretary; Harold E. Cafferata, second vice-president; Gerald D. Timmons, speaker of the House of Delegates, and H. B. Washburn, treasurer. (Standing, l. to r.): Lewis W. Thom, Tenth District; Paul H. Jeserich, Ninth District; C. Willard Camalier, assistant secretary; Edward R. White, Fourth District; Harold M.

Harry Lyons presents gavel to Association president William Alstadt.

Association president William Alstadt addresses convention after assuming office.

HOUSE OF

TRUSTEES

Flickinger, Twelfth District; Robert J. Walls, Eighth District; Howard B. Higgins, Fifth District; Louis M. Cruttenden, assistant secretary; John E. Rush, assistant business manager; Arthur W. Easton, First District; John J. Hollister, business manager; Charles H. Patton, Third District; Percy T. Phillips, Second District; John R. Abel, Thirteenth District; Arthur F. Schopper, Sixth District; Earl G. Jones, Seventh District; Clarence S. Renouard, Eleventh District, and Arthur W. Kellner, Hollywood, Fla., chairman of the General Committee on Local Arrangements.

Percy T. Phillips accepts unanimous nomination as president-elect.

Gerald H. Leatherman, London, secretary-general of the Federation Dentaire Internationale.

DELEGATES

Board, should disclaim efforts to identify the illegal efforts of the "public denturists" with the many dental laboratories in this country and with the N.A.D.L.

"The Board of Trustees points out that the fifth letter issuing from the Inter-State Regional Committee on Prosthetic Service recommends the following steps to the House of Delegates for the solution of the dental laboratory problem: (1) repudiate the Board of Trustees and its July 1957 actions; (2) postpone or destroy the proposed program for the certification of dental laboratory technicians; (3) destroy the present state programs for the accreditation of dental laboratories.

"In essence, if the House adopts the recommendation of this unofficial committee it will effectively destroy all relations between the dental profession and the dental laboratory craft. It will signify the belief of the dental profession that it has no responsibility whatever for those groups which are in adjunctive status. It will leave unsolved all of the current problems which face the profession and craft by ignoring them."

The *Rules* may be a powerful new weapon for suppressing the illegal practice of dentistry through a new federal channel, asserted the Board, adding that in any event the *Rules* can not affect the traditional adjunctive relation which exists between the profession and craft since this relation is governed by state dental practice acts and not by the pronouncements of a federal agency. The *Rules* establish the dental laboratories as an industry under federal regulations and thus destroy any valid claim on their part to professional status or professional prerogatives, the statement declared.

"The adjunctive relation between the dental profession and the dental laboratory craft places some responsibilities upon the dental profession," the statement continued. "These responsibilities cannot be met by attempting to deny the legal rights of the adjunctive group nor by alienating the ethical, responsible members of the group because of possible abuse by a small minority. The adjunctive relation is maintained successfully in most parts of the country and many dentists and dental societies are working successfully with the dental laboratory craft. The Board of Trustees does not believe that national action, jeopardizing and threatening this relation, should be taken merely because of local situations which should have more alert and more statesmanlike attention from those who bear the local responsibility.

"The Board of Trustees," concluded the statement, "is confident that the vast majority of the members of the Association will easily differentiate between an effort to solve existing dental laboratory problems on a reasoned, statesmanlike basis rather than on an effort to solve them by unnecessary attacks and unfounded charges. The permanent impairment of relations between profession and craft, which unfair methods will produce, cannot help but be a disservice to the dental profession as well as to the public."

Dr. Brach asserted that the Board of Trustees, in accepting the FTC *Rules* and the Commission's letter as fulfilling the 1956 directive of the House, had ignored the directive of the House. "The path we are taking must inevitably lead to two-level dentistry," he declared. "Bit by bit we have slipped into one awful mess that augurs poorly for the future of dentistry."

The leadership of the Association, said Dr. Brach, has the responsibility to preserve the autonomy of the dental profession and its full control of all its auxiliaries.

The House voted, 313 to 67, to approve the actions of the Board of Trustees.

PROPOSED BUDGET FOR 1958

Report 4 of the Board of Trustees dealt with financial affairs of the Association

and the proposed budget for the fiscal year 1958. The House approved the report.

In spite of inflationary pressures, the Association had a satisfactory financial year in 1956, declared the Board. Total assets of the Association, as of June 30, 1957, were $4,796,711.

DENTAL EDUCATION

The House of Delegates approved a number of resolutions of the Reference Committee on Dental Education and the Council on Dental Education, among them the following:

1. That groups representing areas of dental practice not recognized as specialties by the Association be encouraged to establish study groups, societies and academies to permit those interested in these areas of practice to extend their knowledge and experience.

2. That dental schools, whenever facilities and faculty permit, be encouraged to provide advanced study opportunities for all areas of dental practice including those not currently recognized as specialties.

3. That the use of the term "specialty" by certifying boards representing areas of practice not formally recognized as specialties of the American Dental Association be disapproved.

4. That the certification of diplomates by certifying boards representing areas of practice not formally recognized as specialties by the Association be disapproved.

5. That one of the criteria for the formal recognition of a dental specialty be the status of advancement of an area of dental practice in accordance with the requirement of the Council on Dental Education "that recognition of the special area is demonstrated by the fact that there are a substantial number of acceptable educational institutions which offer graduate or postgraduate courses of at least one year of study which are directly related to this area."

6. That the approval of the American Board of Prosthodontics be continued with the proviso that in the future it assume responsibility for examining and certifying specialists in those areas of prosthodontics which merit recognition.

TRAINING OF TECHNICIANS

A brief debate occurred on the Reference Committee's recommendation to approve the *Requirements for the Approval of Educational Programs for Dental Laboratory Technicians.*

Dr. Brach opposed the recommendation. Some dental laboratories, he said, opposed the education of dental laboratory technicians because the laboratory work was so departmentalized and rationalized that they felt education would achieve little. The laboratories could not absorb graduates of a dental laboratory training program, and such a program would aggravate the problem of illegal dentistry, he said.

Allison G. James, Beverly Hills, Calif., said that Dr. Brach's statements were based on inaccurate information. Representatives of the National Association of Dental Laboratories, said Dr. James, have declared that graduates of a two-year, half-time technicians' course were worth 25 per cent more. The N.A.D.L. unquestionably would go ahead with some type of program for technicians, said Dr. James.

J. Eugene Ziegler, Los Angeles, head of the school for dental technicians of the University of California, said that in the past ten years the school had graduated about 250 students. "We have yet to have one case of illegal practice from these students," he said. "Most of the graduates are employed by large dental laboratories. We train the students in jurisprudence and ethics. We have a waiting list of employers."

The motion to approve the educational program for dental laboratory technicians was adopted.

William R. Alstadt, President

Percy T. Phillips, President-Elect

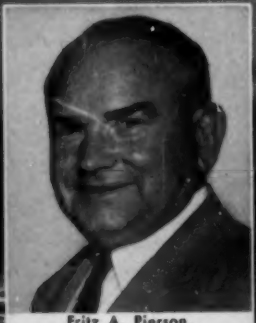
Gerald Timmons, Speaker

Arthur W. Kellner,
First Vice-President

J. Murray Gavel,
Second Vice-President

Bruce F. Wilkinson,
Third Vice-President

Edward F. Mimmack,
Second District Trustee



Fritz A. Pierson,
Eleventh District Trustee

John S. Eilar,
Twelfth District Trustee

H. B. Washburn, Treasurer

Lon W. Morrey, Editor

John R. Abel,
Thirteenth District Trustee

Resolutions submitted by the District of Columbia Dental Society, and the Massachusetts and New Jersey societies, that the training of dental laboratory technicians be at the level of vocational education only, were postponed indefinitely on the ground that the program of the Council on Dental Education assured that training would be essentially at the local level.

A resolution was approved defining The Fund for Dental Education as a worthy recipient and competent distributor of funds received for the furtherance of dental education. The resolution urged component and constituent societies to initiate and participate in continuing programs to make new support for dental education available through the Fund. The Fund has been approved by the American Association of Dental Schools and by the Council on Dental Education of the American Dental Association.

SCIENCE FAIRS APPROVED

Obed H. Moen, Wisconsin, reporting as chairman of the Reference Committee on Dental Research and Therapeutics, said the committee believed that active support of the science fair movement would further the Association's research and education programs over the coming years.

"The science fair movement appears to provide a ready and available mechanism for the development on a national scale of keener recognition on the part of the public of the scientific aspects of the dental profession," stated the report. "It can be a further means of demonstrating the great opportunities that exist for scientific advancement within the framework of a career in dental science and dental practice. The formulation of science fair activities at the local community level is certain to stimulate favorable public attitudes and should measurably enhance the effectiveness of the Association's efforts in obtaining federal and other support for research grants, fellowships, research facilities under the terms of the Health Research Facilities Act, and an independent building for the National Institute of Dental Research at Bethesda. Moreover, through the science fairs the Association can attract to the dental profession more and more of the brilliant young people who up to now have been lost to other scientific professions where public awareness and interest have been stimulated systematically over the years."

The Reference Committee's report was approved.

RELIEF FUND STUDY APPROVED

The House of Delegates approved a resolution of the Reference Committee on Miscellaneous Business, that a study of the Relief Fund be made by the Council on Relief to determine the goal of this Fund. The House accepted the committee's recommendations rejecting proposals that the rules of the Relief Fund be amended to permit making long-term, low interest loans, and that the Board of Trustees investigate the possibility of establishing retirement communities or homes in southern states for retired members and their wives. A resolution of the Ohio State Dental Association proposing that the Relief Fund campaign be discontinued was also rejected.

The committee's recommendation that the "People to People Program" sponsored by the President of the United States be wholeheartedly endorsed was approved.

LADIES' AUXILIARY

Also approved was the committee's resolution that the Board of Trustees be requested to develop a proposal for the organization of a Women's Auxiliary to the American Dental Association on the basis of direct national membership in that auxiliary and not on the basis of a federation of existing constituent society

auxiliaries, as had been proposed by the National Association of Dental Auxiliaries. The Board was instructed to consult on this matter with the Women's Auxiliary and to report back to the 1958 session of the House.

ADMINISTRATIVE MATTERS

The House rejected a resolution from the California State Dental Association that immediate past presidents be invited to attend the sessions of the Board of Trustees and the House of Delegates at the expense of the Association in the year following the completion of their terms as president.

Also rejected was a resolution from the Delaware State Dental Society that the Bylaws be amended to provide that no state constituent society be represented by less than two members in the House of Delegates.

"The Committee feels that in view of the fact that the Association is in the midst of a five-year trial period with the House of Delegates limited to 416 members and that the Board of Trustees is continuing to study this present method, . . . no change should be made at this time," stated the reference committee.

Resolutions from the District of Columbia Dental Society and the Maryland State Dental Association calling for a study of the advisability of increasing the activities of the Washington office were postponed indefinitely, in view of the fact that the Board already had a committee working on the problem and that plans for expansion of such activities were pending.

A resolution from the Massachusetts Dental Society calling for the election of all officers of the Association by the House of Delegates was rejected, inasmuch as the present provisions of the Constitution and Bylaws for selecting the secretary, treasurer and editor are working satisfactorily. Also rejected was another resolution from Massachusetts calling for the appointment of a committee to study the "exigency of eliminating the ad interim powers of the Board of Trustees for establishing policy."

"No organization can properly function without such an authoritative governing body," stated the committee in rejecting this proposal.

NO INCREASE IN COUNCIL SIZE

The Reference Committee on Miscellaneous Business also brought in a proposal to increase the size of the 13 Councils now composed of five members to seven members. The proposal was rejected by a vote of 227 to 139.

A proposal from the Washington State Dental Association calling on the American Dental Association not to enter into group insurance programs in state areas in which similar group programs are operating was rejected, on the grounds that no member of the American Dental Association should be denied the benefits extended to other members of the Association.

OTHER ACTIONS

The House of Delegates saluted Miss Olga Olive Norberg, who had retired last May after serving the Association since 1931. Miss Norberg was secretary to Harry B. Pinney, former secretary of the Association, until his retirement in 1946. She later served the Council on Legislation.

Elected to honorary membership in the Association were:

Dr. Arno B. Luckhardt, Chicago—"a distinguished scholar, research worker, educator and philosopher, whose work and whose outlook have been the source of a great contribution to dentistry";

Gerald H. Leatherman — "for his genuine and increasingly successful effort to bring about greater understanding between the dentists, dental associations and nations of the world";

Honorary memberships in the American Dental Association were awarded to (l. to r.) Gerald H. Leatherman of London, secretary-general of the Federation Dentaire Internationale; Arno B. Luckhardt of Chicago, professor emeritus of physiology at the University of Chicago, and Rep. John E. Fogarty (D., R. I.), a member of the Committee on Appropriations of the U.S. House of Representatives. Shown with the three distinguished recipients is Harold Hillenbrand (r), Association secretary.

Rep. John E. Fogarty, of Rhode Island —"one of the foremost advocates of a sound federal program for increased health benefits to the American people."

Dr. Luckhardt, emeritus professor of physiology at the University of Chicago, was one of the original members of the Council on Dental Therapeutics, and had served on the Council from 1930 to 1948.

Two days after accepting before the House of Delegates his honorary membership in the Association, Dr. Luckhardt died suddenly in his hotel room in Miami Beach.

Dr. Leatherman is the secretary-general of the Fédération Dentaire Internationale and attended the session as a representative of both the Federation and the British Dental Association.

Representative Fogarty has served in the House of Representatives since 1940. He is a member of the Committee on Appropriations and is chairman of the subcommittee which deals with appropriations to the federal health and welfare agencies. He is widely known for his leadership in fostering research and health measures in the interests of all the people of this country.

The House also approved the nominations as associate members in the Association of F. Allan Hoffman, Lancaster, Pa., director of technical research, Lancaster Cleft Palate Clinic; Erling Johansen, director of dental research of the University of Rochester (N.Y.), School of Medicine and Dentistry, and Marshall I. Nevin, New York, a physician who has worked in the field of local anesthesia.

Five hundred and ninety-nine members were elected to life membership in the Association, each having completed 35 years of membership.

The Board reported that beginning in January 1958 C. Willard Camalier, assistant secretary, would devote additional time to the supervision of the Washington Office.

The Board reported it had designated Philadelphia as the site of the 1961 annual session. Already approved were Dallas in 1958, New York City in 1959 (the Association's centennial year), and Los Angeles in 1960.

The Board announced the reappointment of Fred A. Henny, Michigan, as the editor of *Journal of Oral Surgery* for a further period of three years.

INSTALLATION CEREMONIES

Retiring officers of the Association were called to the platform by President Lyons and presented certificates of merit for their services.

The new officers and trustees of the Association were installed.

President Alstadt, in his acceptance speech, said he would pursue the following six major objectives during his term of office: to obtain funds for a new dental research building; to eliminate existing tax discriminations against the dental profession; to raise the Dental Corps in the Army and the Air Force to the same standing as that held by the Navy Dental Corps; to expand the activity of the Council on International Relations; to seek more and better dental care for persons in penal institutions, mental hospitals and nursing homes, and to urge dental examinations for those obtaining life insurance. President Alstadt urged more liaison committees between dental organizations and city, state and federal agencies on dental health needs.

President Alstadt awarded a certificate of appreciation to the retiring President Lyons. Past President Bernerd C. Kingsbury inducted Dr. Lyons, as the twentieth living past president, into the "Past Presidents' Club of A.D.A."

ACTIONS OF THE BOARD OF TRUSTEES

The Board of Trustees met prior to and following the meetings of the House of Delegates. Among actions of the old Board were the reappointment of Lon W. Morrey, Chicago, as editor for, and of H. B. Washburn, St. Paul, as treasurer, for another year.

The Board observed that the total membership of the Association September 30, 1957, was 89,025, compared to a total membership at the end of 1956 of 86,872.

The new Board met the afternoon of November 7. President Alstadt named the following Committee on Rules and order, with himself as chairman: Arthur W. Easton, Howard Higgins, Charles H. Patton, and Harold Hillenbrand, ex officio.

The Board appointed as delegates to the National Health Council for the coming year Victor H. Levitz, New Jersey; Joseph P. Scola, New York, and Rudolph H. Friedrich, Chicago, secretary of the Council on Dental Health.

The following were designated to represent the Association on the Inter-Association Committee on Health: William R. Alstadt, Percy T. Phillips, Kenneth A. Easlick, and Harold Hillenbrand.

Obed H. Moen, Watertown, Wis., was reappointed for another year as the national treasurer (United States) for the Fédération Dentaire Internationale.

Paul W. Zillman, New York, was reappointed for a further term of three years as trustee of the group health accident insurance program.

Floyd W. Pillars was again designated as the Association's representative on the policy-making body of the American Thrift Assembly.

The Board appointed the following to serve as chairmen of their respective councils:

Herbert L. Taub,* New York, Constitution and Bylaws; Harold W. Oppice, Illinois, Dental Education; J. H. Eshleman, Pennsylvania, Dental Health; Thomas J. Hill, Ohio, Dental Research; Lester W. Burket, Pennsylvania, Dental Therapeutics; Walter E. Dundon, Illinois, Dental Trade and Laboratory Relations; Jeff E. Justis,* Tennessee, Federal

Dental Services; H. Cline Fixott, Jr.,* Oregon, Hospital Dental Service; Lawrence R. Ludwigsen,* California, Insurance; Obed H. Moen, Wisconsin, International Relations; J. C. A. Harding, California, Journalism; C. E. Rutledge, California, Judicial; J. Claude Earnest, Louisiana, Legislation; A. Brooks Drake,* West Virginia, Membership; George S. Easton,* Iowa, National Board of Dental Examiners; H. R. Bleier, Wisconsin, Relief, and David J. Fitzgibbon,* Washington, D. C., Scientific Session. Those names marked with an asterisk are new chairmen.

The Board will meet on the following dates in 1958: March 10-12, September 15-17 and November 5-13.

PROPOSED BUDGET FOR 1958

Report 4 of the Board of Trustees dealt with financial affairs of the Association and the proposed budget for the fiscal year 1958.

"The Association's building program has been completed and the new headquarters is in full operation," stated the report. "A total of $1,420,450 was authorized for the entire building project including land, construction, temporary quarters and legal fees. Of this sum, $1,412,597.37 was expended leaving an unexpended balance of $7,852.63. It should be noted that construction was entirely financed out of available reserves and income without the need of converting any securities held in the Restricted Reserve. Now that this call on available funds has terminated, the Board of Trustees will resume its practice of allocating any available surplus to the Restricted Reserve."

In spite of inflationary pressures, the Association had a satisfactory financial year in 1956, declared the Board. The excess of income over expense was $216,767, reported the Board, adding:

"While this summary of operations in 1956 is very satisfactory, it must not become the source of undue optimism. There can be no assurance, for example, that income will continue to rise as it has in the past few years because stabilization of membership and other income can readily be anticipated. Expenditures are also bound to rise so long as the national trend to universally higher costs continues. Both of these factors will operate strongly in 1957 and 1958 with a resultant narrowing of surplus and a definite move to a balanced, rather than a surplus, budget for 1959 and the following years. . . .

"The Association's income appears to be leveling off and 1957 will show little, if any, excess of income over the budget estimate. This interrupts the trend of the past four or five years during which income has expanded about $100,000 annually from sources other than membership dues.

"In 1956, for example, the Association spent $28 for each of the 73,009 active members while receiving only $20 from these members in individual dues. The additional eight dollars, of course, was obtained from income other than membership dues; advertising, exhibits, sale of material, tests and examinations. If this nondues income has now reached a plateau, any increase in costs or program must be financed out of increased membership dues. The Board of Trustees will give careful attention to this situation with a view to recommending an increase in membership dues in 1958 if the present trends are continued or are magnified. . . ."

INCREASE IN DUES SEEN

"In summary the years of rising income and surplus budget appear to be waning with the result that the Association can anticipate no better than a balanced budget in 1959 and a deficit budget in the years thereafter if membership income remains at the present level. In its best judgment, the Board of Trustees believes

that an amendment to increase dues should be proposed at the 1958 annual session and enacted at the 1959 annual session so as to provide new income for the fiscal year 1960. Only in this way can the Association sustain the burden of rising costs and the increasing demands of the membership for program and services."

In its 1958 budget, the Board said it was compelled to reduce the "budget askings" by $61,225 to have an excess of income over estimated expense of $57,466. Some of the reductions in the budget had curtailed current activities, stated the Board. Many new and desirable projects of value to the dental profession could be initiated if funds were available, said the Board.

The House of Delegates approved the Board's operating, underwriting and capital budgets for the fiscal year 1958. The recommended 1958 budget calls for an income of $2,500,600, expenses of $2,443,134, and an excess of anticipated income over expense of $57,466.

Of the budgeted expenses, $833,454 is for administration, $60,950 for annual session, $254,840 for Bureaus, $560,540 for Councils and divisions, $633,350 for publications and $100,000 for the contingent fund.

Income from membership dues is expected to be $1,523,200; from advertising and subscriptions to Association publications, $480,400; earnings on investments, $110,000; exhibit space rentals, $85,000; sale of educational materials, $76,000; from the Council on Dental Education's Division of Educational Measurements, $90,000; from the Council of the National Board of Dental Examiners, $125,000; from the Bureau of Library and Indexing Service, $9,000, and miscellaneous, $2,000.

Additional coverage of important issues and events of the Association's annual session will be presented in the January issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

OFFICERS AND TRUSTEES

William R. Alstadt, Little Rock, Ark., was installed as president of the American Dental Association at the final session of the House of Delegates November 7. At 41 he is the youngest man ever to hold this position. Previously, Dr. Alstadt was Trustee of the Twelfth District. He has been a member of the House of Delegates for many years and served as a member of the Council on Legislation. An orthodontist, Dr. Alstadt is a diplomate of the American Board of Orthodontics and a former member of the American Association of Orthodontists' board of directors. Dr. Alstadt is currently serving on the Defense Department's Health Plan Advisory Committee. He is civilian consultant to the Army-Navy hospital in Hot Springs, Ark., a former president of the Arkansas State Board of Dental Examiners and a former member of the Arkansas Civil Defense Board. Dr. Alstadt is a Fellow of the American College of Dentists and the International College of Dentists. He is a member of the Fédération Dentaire Internationale, the American Association for the Advancement of Science, the American Society of Dentistry for Children and of other scientific organizations. He is a life member of the Japan Dental Association and the Philippine Dental Association. He is a civil service commissioner in Little Rock.

Percy T. Phillips, of New York City, president-elect, is the first native New Yorker to occupy that post. Dr. Phillips has held many executive positions in dentistry at the district, state and national levels. In 1948 the House of Delegates elected Dr. Phillips as its first speaker, and he was re-elected to this post in 1949 and 1950. Dr. Phillips just completed his second three-year term as Trustee for the Second District. He received his professional education at the College of Dental and Oral Surgery, now part of Columbia University, having graduated in 1919. He is a member of the Fédération Dentaire Internationale, the Commission for the Survey of Dentistry, and Psi Omega fraternity. Dr. Phillips is a Fellow of the American College of Dentists, the International College of Dentists, and a member of the New York Academy of Dentistry and the New York Institute of Clinical Oral Pathology. He has received both the Henry Spenadel Award and the William Jarvie Award.

Arthur W. Kellner, of Hollywood, Fla., first vice-president, has served in the local, state and national dental societies. As chairman of the general committee on local arrangements at the 98th annual session, Dr. Kellner direct-

ed the group that contributed to the success of the Miami meeting. A general practitioner, Dr. Kellner received his professional education at the Chicago College of Dental Surgery, graduating in 1925. Dr. Kellner served for many years as secretary of the Florida Board of Dental Examiners. On November 2 he was installed as president of the American Association of Dental Examiners. He has held many civic offices in Hollywood, and is a director of the local bank. He is a member of Delta Sigma Delta and a Fellow of the American College of Dentists.

J. Murray Gavel, of Boston, second vice-president, has had teaching and research experience at Harvard Graduate School of Education, Harvard School of Public Health, Tufts University School of Dental Medicine, and Boston University School of Education. Dr. Gavel holds membership in the American Academy of General Dentistry, American Society of Dentistry for Children, American Academy of Practice Administration and the American Academy of Dental Science (president, 1953-1954). He was president of the Massachusetts Dental Society, 1949-1950, and of the New England Dental Society, 1954-1955. He is a Fellow of the International College of Dentists, and a member of Delta Sigma Delta and Omicron Kappa Upsilon. He was graduated from Tufts University School of Dental Medicine in 1923 and received that university's distinguished service award in 1950. He has served as a delegate to the House.

Bruce F. Wilkinson, of Tyler, Tex., third vice-president, has been active in local and state dental societies. He served as a delegate from the component society to the Texas Dental Association for many years and has held every elective office in his state association. He served as president of the Texas Dental Association, 1953-1954, and is on the board of directors. He has been active on many committees of the state association, such as the committee on group dental health care. Dr. Wilkinson was graduated from Atlanta-Southern Dental College and is a general practitioner. He is a Fellow of the American College of Dentists. He has served for many years in the House of Delegates.

Gerald D. Timmons, of Philadelphia, has been re-elected to serve his third term as Speaker of the House. He is dean of Temple University's School of Dentistry. Dr. Timmons was graduated in pharmacy from Valparaiso University in 1917 and received his D.D.S. degree from Indiana University School of Dentistry in 1925. His teaching career in dentistry began at his alma mater. He remained associated with the school until 1940, when he left his position as acting dean to become executive secretary of the American Dental Association. In 1942 he became dean at Temple. Dr. Timmons is a past president and a former secretary-treasurer of the American Association of Dental Schools. In 1956 he was installed as president of the American College of Dentists.

Lon W. Morrey, of Chicago, reappointed editor of the American Dental Association by the Board of Trustees, has served as editor since February 1947. Prior to serving as editor, Dr. Morrey headed the Association's Bureau of Public Relations (1933-1946). He was graduated from the Chicago College of Dental Surgery in 1923, and began his career in private practice. He served as school dentist at Lake Forest, Ill., and was a pioneer director of the dental division of the Illinois State Department of Health. Later, he was chief of the dental health division of the Chicago Board of Health.

H. B. Washburn, of St. Paul, was reappointed Association treasurer by the Board of Trustees. Dr. Washburn has held that position for nine years. He is a former president of the American Dental Association and is a past president of the St. Paul District Dental Society and the Minnesota State Dental Association.

Edward F. Mimmack, of Buffalo, was elected Trustee of the Second District serving dentists of New York state. His father, Alfred E. Mimmack, was a dentist in practice from 1895 to 1948, and was a graduate of the University of Buffalo's first class in dentistry. Dr. Edward Mimmack was graduated from the University of Buffalo School of Dentistry in 1921. He served as president of the Eighth District Dental Society of the State of New York in 1930. He is a member of the board of governors of the Dental Society of the State of New York and is chairman of the society's council on education. He was president of his alma mater's alumni association in 1931, and is now chairman of the annual dental education participating fund and chairman of dental alumni in the University's fund drive. He is a member of Omicron Kappa Upsilon, and served as supreme grand master of Delta Sigma Delta, 1945-1946, and has been supreme treasurer since 1951. He is a Fellow of the American College of Dentists and the International College of Dentists. He has served on the faculty of the University of Buffalo School of Dentistry since 1921, and is now professor of materia medica and therapeutics. He has been

a member of the Council on Dental Therapeutics. His son, Jack E., is a dentist and is now in practice with his father.

Fritz A. Pierson, of Lincoln, Neb., was elected Trustee for the Eleventh District, serving dentists of Nebraska, North Dakota, South Dakota, Wyoming, Montana, Idaho, Washington, Oregon and Alaska. Dr. Pierson has been a member of the faculty of the University of Nebraska since 1922 and is now professor of dental medicine at the College of Dentistry. He has been active in local and state dental societies and has served as secretary of the Nebraska State Dental Association since 1930, save for 1942 and 1943 when he served as president-elect and president, respectively. Dr. Pierson served several years on the Council on Constitution and Bylaws. He has been a member of the House of Delegates since 1930. He is a member of the Special Committee on the Survey of Dentistry. Dr. Pierson is a Fellow of the American College of Dentists, served on the board of regents from 1946 to 1951, and was president in 1953. He is a member of Xi Psi Phi.

John S. Eilar, of Albuquerque, N. Mex., was elected Trustee of the Twelfth District, representing dentists of New Mexico, Colorado, Kansas, Oklahoma, Texas, Arkansas and Louisiana. He is a past president of the New Mexico Dental Association and has served as its secretary since 1937. He assisted in establishing a division of dental health in the State Department of Public Health and in writing the first manual for teaching dental hygiene in the public schools of New Mexico. He edited the first *New Mexico Dental Journal* in 1942. Dr. Eilar has served in the House of Delegates since 1948; he was on the Council on Insurance from 1952 to 1957, and was chairman beginning in 1954. Dr. Eilar is a Fellow of the International College of Dentists and a member of Xi Psi Phi.

John R. Abel, of Los Angeles, was re-elected Trustee of the Thirteenth District, representing dentists in Arizona, California, Hawaii, Nevada and Utah. An orthodontist, Dr. Abel is a graduate of the University of Southern California Dental College, a faculty member of the School's graduate division of orthodontics, and is a past president of both the Los Angeles Dental Society and the Southern California Dental Association. He has served on many committees of the American Dental Association.

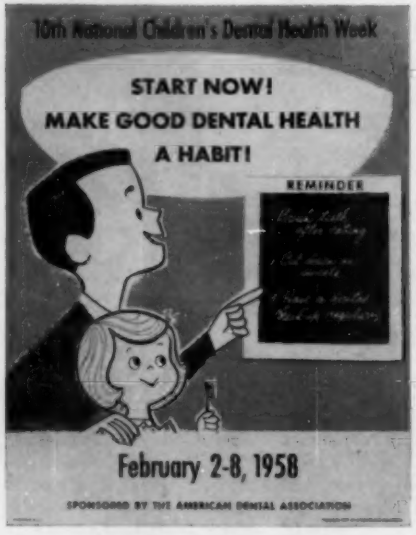
Association Affairs

CHILDREN'S DENTAL HEALTH WEEK PUBLICITY AIDS READY

Miniature posters and 55-second TV spot announcements publicizing National Children's Dental Health Week, February 2 to 8, 1958, are available from the Central Office, according to the Bureau of Dental Health Education.

Dentists will find the miniature (3 inches by 4 inches) posters suitable for enclosure with their monthly statements and recall notices. Dental societies can make these posters available to schools for distribution to children.

Topics of the TV spot announcements are "The Primary Teeth," "Diet" and "Toothbrushing." Two other films, "Par-



Miniature poster carries vital message

tial Dentures" and "Complete Dentures," are directed toward adult viewers. All five films, however, may be purchased as a set. The low price of the set is possible because the costs of production were underwritten by the Dentists' Supply Co. of New York.

Information regarding the price of these promotional aids may be obtained from the Association's Order Department, 222 E. Superior St., Chicago 11.

HAL M. CHRISTENSEN JOINS COUNCIL ON LEGISLATION

A former associate counsel of the Legal and Monetary Affairs subcommittee of the Committee on Government Operations in the House of Representatives has been appointed assistant secretary of the Association's Council on Legislation, according to an announcement by Harold Hillenbrand, Association secretary. Hal M. Christensen of Arlington, Va., assumed his duties at the Central Office on December 1.

H. M. Christensen

Mr. Christensen, a graduate of the Washington College of Law of the American University, Washington, D. C., has specialized in conducting legal and economic research and has dealt extensively with legislation relating to tax matters. He has been affiliated with several government agencies as a counsel and also has engaged in private practice. He is a native of the state of Utah.

A. B. LUCKHARDT, DISCOVERER OF ANESTHETIC, DIES

Arno B. Luckhardt, who, in 1923, discovered the anesthetic uses of ethylene gas, died on November 6 in Miami Beach, Fla., at the age of 72.

Doctor Luckhardt, professor emeritus of physiology at the University of Chicago, was one of the original members of the Association's Council on Dental Therapeutics. He was in Miami to attend the annual convention of the American Dental Association where he received an honorary membership.

Arno B. Luckhardt

A native Chicagoan, Dr. Luckhardt received his master's and doctor's degrees from the University of Chicago. He joined the faculty in 1912 and retired in 1947.

His discovery of ethylene as an anesthetic was hailed by the medical profession as the first major new development in anesthesia since the use of ether in 1847. He also was known for his work in the physiology of the parathyroid glands, the history of physiology and medicine, visceral sensory nervous system and in gastric and pancreatic secretion.

He was a member of several professional national and international societies.

MEMBERS REMINDED TO ORDER 1958 ASSOCIATION DIRECTORY

Orders for the 1958 *American Dental Directory* are still being accepted. The *Directory,* which will be published later

this month, contains over 1,200 pages of information on more than 100,000 U.S. dentists, as well as lists of dental schools, dental specialists, addresses of state dental associations and their officers, and information regarding national dental organizations throughout the world.

The price of the *Directory* is $15.

Dental Education

DENTAL EDUCATION PROGRAMS CONTINUE TO INCREASE

California • Two programs of special interest have been announced by the University of California School of Dentistry. Beginning July 1, 1958, a three year graduate program in oral surgery, designed to fulfill the requirements of the American Board of Oral Surgery, will be offered by the school. Further information on this course may be obtained from the school in San Francisco. Application blanks may be requested from the University of California graduate division in Berkeley.

A two day refresher course in oral physiology will be presented at the university's hospital on December 14 and 15. Tuition for the course is $40. Applications may be addressed to the postgraduate education division of the University of California School of Dentistry in San Francisco.

Toronto • Applications will be accepted until March 1 for enrollment in postgraduate courses leading to specialist certification in the fields of oral surgery and anesthesia, orthodontics, pedodontics and periodontics. All courses are of two year duration with the exception of oral surgery which is a three year program. Further information and application blanks may be obtained from the chairman of the division of postgraduate studies, Faculty of Dentistry, University of Toronto, 230 College St., Toronto, Ontario.

Tufts • The University School of Dental Medicine will present a three day postgraduate refresher course on diagnosis and management of occlusal disharmonies from April 7 to 9, 1958. Enrollment is limited to 12, and tuition for the course is $75. Additional information and application blanks are available from the director of graduate and postgraduate studies, 136 Harrison Ave., Boston.

ANNOUNCE FELLOWSHIP PROGRAM FOR 1958-59

Approximately 850 graduate fellowships for scientific study will be awarded during 1958-59 by the National Science Foundation, assisted by the National Academy of Science—National Research Council.

Graduate fellowships are available to those who are working toward the masters' or doctoral degrees in the first, intermediate or terminal year of graduate study. College seniors who expect to receive a baccalaureate degree during the 1957-58 academic year are also eligible to apply. Holders of the M.D. or D.D.S. degree are eligible for one of the 85 postdoctoral fellowships for further training for a career in research provided they can present an acceptable plan of study and research.

All applicants for graduate (predoctoral) fellowships will be required to take an examination at a designated center on January 18, 1958. The deadline for receipt of applications for graduate fellowships is January 3, 1958, and the deadline for regular postdoctoral fellowships is December 23.

Further information and application materials may be secured from the Fellowship Office, National Academy of Sciences—National Research Council, 2101 Constitution Ave., N.W., Washington 25, D. C.

PENNSYLVANIA TO SPONSOR ENDODONTICS CONFERENCE

Geoffrey L. Slack of England, Carl-Heinz Fischer of Germany and Sylvio Bevilacqua of Brazil will be among the international essayists who will participate in the Second International Conference on Endodontics during the week of June 22, 1958. The meeting will be held at the University of Pennsylvania, Philadelphia.

Essayists and group leaders from the United States will include Gerritt Beve-

lander, New York; John I. Ingle, Seattle; Ernest Jawetz, San Francisco; Robert G. Kesel, Chicago; Floyd D. Ostrander, Ann Arbor, Mich., and Helmut Zander, Rochester, N. Y. Louis I. Grossman, Philadelphia, is director of the conference.

The first meeting was held in Philadelphia in 1953. It is planned to hold these conferences every five years.

Dental Societies

DALLAS MID-WINTER CLINIC TO MEET IN JANUARY

Eight nationally known practitioners will serve as clinicians at the 31st annual Dallas Mid-Winter Dental Clinic to be held January 26-29, 1958, at the Statler Hotel.

The clinicians will be: I. Irwin Beechen, Oakland, Calif.; Carl O. Boucher, Columbus, Ohio; Raymond E. Johnson, St. Paul; Harry M. Klenda, Wichita, Kan.; Claude S. LaDow, Philadelphia; R. A. McEwen, Atlanta, Ga.; E. D. Shooshan, Pasadena, Calif., and Louis C. Schultz, Ann Arbor, Mich.

The Clinic is sponsored by the Dallas County Dental Society. Chairman of this year's meeting is O'Neal M. Gray. He is assisted by Myers Thornton, Bibb Ballard, Brooks Bell, Robert E. Lamb, Ben Lawrence, Loren Miller, Jack L. O'Banion and Jack H. Sweptson.

General

CARE FOOD PACKAGES IDEAL CHRISTMAS GIFT

CARE is preparing three million special packages of U.S. surplus foods for shipment to the needy and hungry in other lands throughout the world. Readers of *The Journal* can help to speed these gifts to their destinations by donating one dollar. This amount will send 22 pounds of food to a destitute family in any of 12 countries—enough food for almost an entire month.

This year, CARE packages can be sent overseas in the names of others—friends, family or business associates. Gift card announcements will be furnished upon request.

The donations cover the cost of packaging and of distribution in recipient countries. Food crusade contributions in any amount may be forwarded to any local CARE office or directly to CARE headquarters, 660 First Avenue, New York 16.

ALPHA OMEGA HOLDS GOLDEN JUBILEE MEETING

Alpha Omega fraternity will celebrate its golden anniversary meeting in Baltimore, birthplace of the organization. The meeting will be held at the Lord Baltimore Hotel on December 28, 29 and 30.

The Reader Comments

WALDBOTT PRESENTS HIS VIEWS ON FLUORIDATION

Information disseminated by the American Dental Association about my research on fluorosis requires clarification.

My description of the first case of chronic fluoride intoxication from drinking artificially fluoridated water (Internat. Archives of Allergy 7:70-74, 1955) presented evidence of an organic disease which clearly fitted the description of incipient fluorosis reported by others, from drinking natural fluoride water and from industrial sources.

The same clinical syndrome was subsequently encountered in 52 cases most of whom I personally examined. Some had thorough laboratory studies and consultations by competent specialists (Acta Medica Scand. 156: 157-168, 1956). A questionnaire was used for preliminary orientation and for screening. In those not personally examined, laboratory data and examination findings were obtained from hospital records. A few cases were included in which the patient's history was so characteristic of the disease that it was, by itself, considered of adequate diagnostic significance.

The wide variety of symptoms affecting many organs is typical of chronic intoxication from other sources. Whereas at first these symptoms seemed vague and unrelated, additional study revealed a close relationship with the syndrome of hyperparathyroidism. The following symptoms were encountered: neuromuscular manifestations, especially paresthesias and partial paresis in hands, arms and legs, gastro-intestinal and urinary disturbances, arthritic changes in the lower spine and other joints, cephalgia.

Laboratory data revealed hypercalcemia and, in some patients, considerable hypercalcinuria. In a few cases the hypercalcemia was accompanied by a simultaneous hyperphosphatemia. Both fluorosis and hyperparathyroidism are associated with a disturbed calcium metabolism. The strong affinity of fluoride for calcium is generally recognized.

In every case the disease subsided completely and permanently upon elimination of fluoridated water for drinking and cooking.

One case, (now in press) throughly studied during a period of three years, at times showed evidence of calcium deficiency, namely, tetaniform convulsions. However, during the intervals between convulsions, hypercalcemia and hyperphosphatemia were present. Whereas the tetanic episodes were accompanied by increased fluoride excretion, the urinary F. output decreased upon their subsidence. That this disturbance in the calcium metabolism was due to fluoride has recently been established by additional laboratory studies.

Following a single test dose of 6.8 mg. of fluoride in water (as NaF) distinct changes in both calcium excretion and calcium blood levels were noted in some of these individuals. (Since the total urinary volume ranged as high as 4100 c.c. in some patients, the above test dose corresponds to the amount of fluoride ingested in food and drink in the course of one to two days.)

The twenty-four hour urinary excretion of fluoride showed variations from person to person of as much as 4.3% to 99%. Daily urinary volume over a twenty-four hour period ranged up to 4100 c.c. on controlled calcium and phosphorus intake. These persons were not aware that the test dose contained fluoride. In nine cases symptoms of fluorosis were reproduced by this dose.

In contrast to the above manifestations of intoxication some patients showed evidence of allergy to fluoride such as allergic nasal disease, urticaria, allergic dermatitis. (Internat. Archives of Allergy 9:241-249, 1956.)

My studies clearly demonstrate that there are great variations from individual to individual both as to degree of toleration of fluorides by the system and the manner in which they affect certain individuals.

The available statistical studies dealing as they do with groups and over-all averages do not reveal damage to individuals. My research proves that neither a standard concentration of F. in water, nor a standard daily dose of F. can be safe for everyone.

George L. Waldbott, M.D.

***Editor's Comment** • The Journal publishes in full Dr. Waldbott's letter to the editor regarding fluoridation, not because The Journal agrees with the letter, but because his own statement of his argument should be evaluated by Journal readers. Publication of Dr. Waldbott's letter does not, in any way, alter The Journal's opinion that the overwhelming mass of scientific evidence favors fluoridation.*

Pope Pius XII addresses members of the Twelfth Dental Congress

To visitors from America and other countries, as well as to myriads of Roman citizens, the public audience granted by Pope Pius XII to the XII International Dental Congress, Sunday, September 8, was an event and a ceremony of great interest. Long before the appointed time (2:30 P.M.) thousands of persons had crowded the Basilica of St. Peter to overflowing.

The Holy Father delivered an address, directed to members of the Congress and the F.D.I., mostly in French, the text of which appears, in part, in following paragraphs.

At the close of the address, the Pope received at the Papal throne, Senator Dr. L. Benedetti, president of the Congress; Dr. Pio Lalli, secretary; Dr. A. Joachim, president of the F.D.I.; and Dr. G. H. Leatherman, secretary of the F.D.I. Then circling the pulpit on the *seda gestatoria* (sedan chair) he blessed the multitudes of people, and descended to greet a number of distinguished personages of the dental profession. Members of the Council and officers of the F.D.I., numbering about thirty, were personally greeted by the Pope. Among these, the Americans presented were LeRoy M. Ennis, Obed H. Moen, Oren Oliver, Harold Hillenbrand, and representing WHO, Carl L. Sebelius.

After the exercises had closed and the Pope had withdrawn, many enthusiastic persons lingered on the Plaza of St. Peter's to salute the Pope when he appeared at the open window of an upper floor.

ADDRESS OF HIS HOLINESS POPE PIUS XII

In this year of the Lord, many thousand dentists from all parts of the world have come to Rome to participate in the Twelfth Congress of the Fédération Internationale Dentaire. They came as the delegates of their national professional associations to discuss occupational and organizational problems and to share with each other the experience and knowledge obtained in recent dental research and practice. These developments have made dentistry one of the most important branches of the public health service.

We were delighted to learn that this convention had expressed the desire to be addressed and blessed by Us.

One of the most fortunate results of the universal progress achieved in many fields of science is the ever increasing awareness of the necessity to combine all efforts in diagnosis and treatment and to exchange all scientific information for the benefit of mankind.

There is hardly any part of the human body more important to individual and general health than the mouth. In the oral cavity mastication functions as the initial step of digestion, the sense of taste distinguishes between flavors of food and the function of speech produces articulate sounds used for the expression and communication of thoughts.

Dentistry plays a significant role in pro-

moting and maintaining human health and welfare. Dentists have achieved great improvements in treatment and cure of diseases, in elimination and correction of abnormalities and in prevention and detection of illnesses and disturbances not necessarily associated with the maxillofacial region. The influence which proper articulation, mastication and respiration have on body and soul cannot be overemphasized.

During the last decades, from the clinical observations of dental practitioners and from the painstaking studies and experiments of dental researchers, a department of dentistry, orthodontics, has developed. Orthodontists are mainly concerned with the prevention and correction of irregularities of the teeth and malocclusions. More recently, another department of dentistry has evolved, pedodontics, which is concerned with all phases associated with the mouth and tooth conditions of children.

Great progress has been made in the knowledge of the etiology of oral and

Pope Pius XII addresses delegates to the XII International Dental Congress in Rome. Special audience was granted on September 8 at St. Peter's Basilica. Later, he conversed privately with several members of the delegation.

dental diseases. Far more important than the treatment, however, is the prevention. In this field dentistry has made significant contributions to mankind.

Another important function of dentistry is the dissemination of information and education regarding dental health and hygiene to the parents. Failure of proper occlusion of the jaws and malposition of the teeth are often produced by seemingly harmless habits such as thumb-sucking, mouth breathing, nail chewing and twitching of facial muscles which may influence chewing, swallowing and speech. Advice, given at the right time, is not only a valuable factor in the education of children and parents but contributes greatly to the prevention and correction of faults in personality and to strengthening the will power.

Orthodontics, and more so pedodontics, has facilitated improved behavior and personality patterns in children and adolescents. The population in many countries has profited immensely by the introduction of large-scale public health programs in which dentistry plays a major part. Periodic oral and dental examinations by school dentists have often led to the discovery of diabetes, cancer and other dangerous diseases.

The strong fear of patients who associate pain with dental treatment of any kind seems to be lessened by the introduction of ultrasonic and other treatment methods. Dental art, which is mainly concerned with the care of teeth and the maintenance of oral health, therefore, often borders the field of applied psychology.

We believe that within a short time, as the result of the growing cooperation between dentists, physicians, parents and teachers, a radical change for the better will occur in the general health condition of all members of the human race.

We congratulate you, dentists of the world, on the care, patience, understanding and skill with which you carry out your excellent work. We wish you success and satisfaction for yourselves, your profession and for men, women, juveniles and children of all nations who benefit from your services.

In praying to the Lord of the Universe to bless you and your families, We bestow upon you and all who desire it Our Apostolic Blessing.

Cases and Comments

MULTIPLE SUPERNUMERARY IMPACTED MANDIBULAR BICUSPIDS

By J. K. Jennings, Jr., D.D.S., Boston

A white man, age 20, reported to the dental clinic for a routine examination. The check-up revealed a full complement of teeth, with the exception of one upper third molar, and a normal (Angle Class I) mesiodistal jaw relationship. Carious lesions were discovered, and although oral hygiene was adequate, the need of a prophylaxis was apparent. The teeth were in a good state of repair. The only apparent abnormality of occlusion was a lower left second bicuspid which was crowded out of the arch buccally and was impacted between the first molar and first bicuspid. A periapical film showed two additional bicuspids imbedded in the mandible. Further roentgenographic examination was indicated at this time.

The patient's history, personal and family, was noncontributory. The physical findings and laboratory examinations, including a routine blood and urine analysis, were normal. There were no apparent tissue anomalies. Intraoral roentgenograms did not reveal any other supernumerary teeth.

It was decided to remove the three impacted bicuspids and attempt to leave the first bicuspid undisturbed. At the time of surgery, the extent of damage to the mesial root of the first molar was to be reviewed with the idea of retaining this tooth if possible.

Beginning the day before surgery and continuing for four days postoperatively, the patient received 600,000 units of procaine penicillin, administered intramuscularly. In addition, diphenhydramine hydrochloride, 50 mg. every four hours, was prescribed postoperatively in an attempt to limit postsurgical edema. Before surgery, 100 mg. of pentobarbital sodium and 1/150 grain of scopolamine were administered.

Local anesthesia (lidocaine hydrochloride with epinephrine 1:50,000) was administered. The surgical procedure consisted of a 5 cm. incision along the vestibule from the anterior region of the second molar to the cuspid. The periosteum was elevated and the mental foramen, including its contents, was bluntly dissected, exposed, identified and preserved. A second incision was made perpendicular to the original one, occlusally to the level of the gingival crest of the exposed impacted bicuspid. The buccal plate of bone was removed, and this tooth was elevated and delivered. Additional bone was removed lingual to this region, which exposed the follicular sac of the intermediate impacted bicuspid. The sac was dissected and the tooth was elevated but could not be delivered. It then was sectioned at the cervix, and first the crown and then the root were easily delivered.

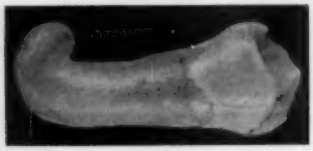
Additional osseous tissue was carefully removed down to the level of and distal from the mental foramen. Much of the mesial root of the first molar was exposed, which revealed a great amount of resorption from the pressure of the crown of the most inferior impacted bicuspid. It was decided at this time to remove the first molar. When this had been accomplished, additional buccal, lingual and inter-

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Lieutenant, Dental Corps, U. S. Navy, Boston Naval Shipyard.

Multiple impacted supernumerary bicuspids; preoperative views

Postoperative lateral jaw view



Most inferior impacted bicuspid

septal plate was removed in anticipation of delivering the most inferior impacted biscuspid in an occlusodistolingual path of withdrawal. The edges of the buccal and lingual plates were rounded with a rongeur forceps and were smoothed with a bone file. The tissues were approximated with a series of interrupted no. 000 black silk sutures. Bleeding was controlled with a gauze pack.

The patient was on a soft diet for about one week. After five days, the sutures were removed. Recovery and healing were uncomplicated and uneventful.

The unusual condition in this patient could only be diagnosed by a careful roentgenographic examination. A unique surgical problem was present both from the operative standpoint and because of the possible complications, such as surgical fracture of the mandible and the danger of causing a hypoesthesia or paresthesia of the mental nerve region.

CONTROL OF BLEEDING IN IDIOPATHIC THROMBOCYTOPENIC PURPURA

By John J. Schory, D.D.S., Canton, Ohio

On March 17, 1956, a 24 year old white man came to the office with a request from his dentist to remove three third molars that were carious. His past history revealed that on a previous occasion he had had the other third molar removed, and for one month after the extraction, the socket had oozed continuously and the patient had returned each day so that the socket could be packed.

A blood study was conducted with the following observations: red blood count, 6,100,000; hemoglobin, 16 Gm. per 100 milliliters; bleeding time, 30 seconds; coagulation time, 5 minutes, 40 seconds; platelet count, 130,000.

His physician prescribed vitamin K for several weeks prior to surgery. On May 21, 1956, he was hospitalized and intravenous injections of conjugated estrogens, 20 mg. every three hours, were begun. The following day the patient was anesthetized with sodium thiopental and the three teeth were removed. An absorbable gelatin sponge was placed in the socket and the socket then was sutured. The intravenous medication was continued for three days postoperatively. Since there was no oozing or bleeding, the patient was discharged.

Several days later oozing recurred, which was controlled by gauze pressure packs. He again appeared in the office 25 days postoperatively, this time with considerable hemorrhage. More absorbable sponges were placed in the sockets and sutured. Intravenous conjugated estrogens, 20 mg., again was administered. Three days later, the sutures were removed and only slight oozing occurred afterward.

On May 16, 1957, the patient appeared in the office with an abscessed lower left second molar. He was again hospitalized and administration of conjugated estrogens, 20 mg. intramuscularly every six hours, was started immediately. His blood condition was the same as before except that the platelet count was 119,000.

The following day the tooth was removed. The anesthetic solution used was composed of propoxycaine, 0.4 per cent; procaine, 2 per cent and Levophed, 1:30,000. At the time of surgery, an intravenous injection of conjugated estrogens, 20 mg., was given. Absorbable sponges were placed in the socket, but no sutures were used. Instead, gauze pressure packs were applied. For the following four days, no oozing was noticed, and the patient was discharged. Oral tablets containing conjugated estrogens, 2.5 mg., were prescribed for ten days.

No evidence of oozing or hemorrhaging followed, and recovery was uneventful.

The problem with idiopathic thrombocytopenic purpura is to keep the blood clot from dissolving. To date, there is no specific treatment for this condition and no acceptable method for transfusing platelets.

The action of conjugated estrogens is unknown, but it has been proved that this substance can control bleeding under several conditions. As no other suitable drug could be found, it was decided to try this drug. In this case, the drug proved beneficial.

603 Thirteenth, N.W.

SOLID LUBRICANTS FOR DENTAL HANDPIECES

By Duncan McConnell, Ph.D., Columbus, Ohio.

Ordinary lubricating liquids, such as animal or mineral oils, are not ideally suited to dental handpieces or contra-angle heads. Oils tend to become contaminated by abrasive particles, including cuttings of enamel and dentin. Furthermore, sterilization or contamination of the lubricant by water or saliva reduces its effectiveness, so that fairly thorough cleaning and replacement of the oil is frequently required.

On the premise that a solid lubricant of the molybdenum disulfide type might overcome some of these difficulties, the bearing surfaces of a few handpieces and contra-angles were coated with a commercially available lubricant by the manufacturer. The material used was Surf-Kote H-108, manufactured by Hohman Plating & Mfg., Inc., 814 Vermont Ave., Dayton 4, Ohio.

The handpieces and contra-angles thus treated were issued for clinical use by students in operative dentistry at the Ohio State University. The following instructions were issued with these instruments:

"The instruments with which these instructions are supplied have a special, "permanent-type" lubricant. Do not use oil or grease on these instruments under any circumstances.

"These instruments are not to be subjected to overly severe operating conditions and should be cleaned according to the following instructions.

"After each use of the contra angle, run it for 10 seconds with the head immersed in clear water. Remove, shake out excess water, and run for 10 seconds in acetone. Shake off acetone and run for 10 seconds dry. (Do not put acetone in paper cups. Remember that acetone is highly inflammable.)

"Clean the straight handpiece in a similar manner after each day's work in the clinic. Immerse one and a half inches of the lower end while running in water or acetone."

Two student operators put considerable mileage on their handpieces and contra angles during three months of use. Although satisfactory service was not obtained from two other sets of instruments, these difficulties may have resulted from improper condition of the instruments prior to coating, inasmuch as some of them were not new but had been returned because of improper performance.

Inasmuch as the lubricating material is applied by spraying, but must be heated in order to obtain the proper type of surface coating, this kind of lubrication cannot be satisfactorily applied by individual dentists, but might be used by manufacturers of dental instruments if further experimentation indicates that these coatings will give satisfactory service for several years.

On the basis of the preliminary experiences, it is concluded that further investigation of the use of solid lubricants would be advantageous, particularly on rotary instruments that employ sleeve-type bearings and operate at speeds up to 10,000 rpm.

University of Ohio

Special research fellow, National Institute of Dental Research.

Civilization and Language • Civilization must come abruptly to an end if man's greatest cultural and technical invention, the human language, should be forgotten. *Lewis Mumford. Essays of Ideas.*

COUNCIL ON DENTAL HEALTH

Budget payment plans for the individual purchase of dental care: IV

In addition to a full understanding of the policy and administrative responsibilities of the bank and the dental society in the operation of the budget payment plan, there must be agreement as to the responsibility of each agency in meeting the costs of operating the plan.

In general, the bank should assume all of the costs which are incurred in normal banking procedures, such as:

1. Costs of the bank's participation in the negotiation and development of the budget payment plan.

2. Costs of the bank's provision of materials required in the consummation of budget contracts in the dentist's office, including (a) forms for individual contracts between the dentist and the bank; (b) instruction material for the dentist and his staff on the proper method of presentation of the budget plan and execution of the credit application and note form, and (c) credit application and note forms.

3. Costs of the bank's processing of the application form, including the credit search and report on the applicant, extension of the credit and liquidation of the loan under the agreed formula for collection.

4. Costs of the agreed participation of the bank in the promotional features of the plan.

The interest which is charged to the patient includes the costs of administering the credit extended to him under the plan, the cost to the bank for borrowing the credit (money) with which to operate and a reasonable profit for the bank's operation.

It should be clear to the dental society that the costs of the bank's operation will be directly related to the efficiency of its operation and that all unnecessary details which the bank is forced to assume through careless or inefficient procedures arising from the individual dentist's use of the plan or in the bank's internal administration of the plan will be reflected in the cost to the patient. In order for the plan to have the greatest acceptability to the patient, the dental society, in cooperation with the bank, should make every effort to assure that the highest possible efficiency is maintained in the operation of the plan through periodic evaluation of the bank's operation of and problems associated with the plan.

The dental society should be prepared to assume the costs of operating the budget payment program that arise beyond the sphere of the bank's normal operation. These costs will include such items as:

1. Development of statistics as to the number of dentists and patients who would participate in, and be served by, the plan. This information should include estimates of immediate interest and of the long-range potential of the plan.

2. Provision of available information on existing plans and on the development of new plans.

3. Participation by the dental society in the negotiation and development of the plan.

4. Education of the membership in use of the plan.

5. Administration by the dental society of the plan including (a) individual problems arising between the dentist and the bank, the dentist and the patient and the patient and the bank through their participation in the plan; (b) periodic evaluation of the plan by the dental society and the bank; (c) negotiation between the bank and the dental society of improvements in the operation and promotion of the plan; (d) collection of information and data on (1) participation of eligible dentists, (2) potential utilization by patients, and (3) patients' reactions to their experience in using the plan.

6. Communication to members of continuing information on changes in the plan, rules for its operation and suggestions for improving their use of the plan.

7. Conduct of public relations program and public information program of the budget plan, including the publication of pamphlets or other appropriate materials.

The dental society should consider what sources of income are available for meeting its costs in the plan, namely, (1) the operating budget of the dental society; (2) enrollment fees for dentists participating in the plan; (3) the funds returned to the dental society from the liquidation of delinquent accounts which the dental society has purchased from the bank through the dental society's loss reserve.

OPERATION OF PLANS THROUGH SPECIALIZED COMPANIES

In addition to the generalized programs of budget payment plans operated through banks for financing the costs of various goods and services, credit in the purchase of similar items is administered also by many specialized finance companies. Such companies may limit their financing to the purchase of automobiles, household appliances, real estate or particular services. Their operation is based on the fact that a full understanding of credit as related to the purchase, use, maintenance and replacement or renewal of the particular goods or services will allow for the development of maximum efficiency at minimum cost in the administration of that credit.

Where the administrative cost can be kept below that of the financing operation through a bank, the specialized company can develop a specific business for administering credit for a particular class of goods or services. To support its operation, it can obtain the money or credit from a bank in bulk amounts at a preferential rate. The preferential bank loan rate, coupled with reduced administrative costs, allows such a company to make the credit available to the customer at a competitive cost with a reasonable profit on the operation.

Through the Medical Bureau of Pittsburgh, members of the Allegheny County medical and odontological societies have established the mechanism of budget credit for dental care. The Medical Bureau is a separate, nonprofit corporation that was created by members of the medical and dental societies to handle credit services, collections and other economic problems of medical and dental practice. Only members of the medical or dental society or the Hospital Conference of Western Pennsylvania are eligible to become members of the Medical Bureau.

In 1940, the Bureau developed its Budget for Health Plan. Under this plan, patients make application for credit in the amount of the doctor's fee and sign a judgment note at the Bureau where they are interviewed and their credit is investigated. On approval, the Bureau extends the credit without recourse to the dentist and collects all payments on the loan.

The dentist is paid his fee, less a discount charge of 6 per cent and a three dollar service charge, by the Bureau on the completion of his services. The patient's monthly payments are made to the Bureau. The Bureau operates with funds it borrows from the bank against credit paper which is used as collateral. The notes are discounted every 30 days on a prearranged schedule, at which time the Bureau pays interest on its unpaid balance.

The cost of administering the service and the expense of borrowing the money are met by the physician or dentist. The patient does not pay any interest or other charge for the credit.

The Budget for Health Plan is designed as a nonprofit activity service program with all costs of operation being borne by the participating physicians, dentists and hospitals. Its purpose is to enable patients to avail themselves of health care at the time of need through a convenient method of paying for the care at no additional cost. Since its inception, the Budget for Health Plan has financed $1,750,000 in health costs for about 28,000 people.

The Arizona State Dental Association is presently developing the necessary statutory authority for the establishment of a separate credit corporation through which dental bills can be financed. The Washington State Dental Association is also studying the problem of establishing a state-wide budget payment plan. The Seattle district component of that association has in existence a well-established and successful budget plan which is operated through a bank. The success of that plan has created a desire among the rest of the dentists in the state for some form of budget payment.

The operation of budget payment plans through specialized dental financing agencies is limited at present. There is some indication, however, that, as plans become well-established and the principle of budget financing of dental care gains wide acceptance, the complete administration of the plans will be taken over by specialized agencies in the interest of more efficient and economical operation and to expand the capacity of such plans to include more of the population.

Dental service corporations presently function as dental health agencies through which groups of persons can purchase their dental care from groups of dentists. As they grow and develop, it may be that such corporations will be able to include within their operation the administration of budget payment plans for financing the costs of dental care for individuals not identified with groups.

SUMMARY

Application of the credit procedure in the dental field began with an idea which was well developed in theory but for which there was no specific experience or data. Through the enthusiasm and activity of several dental societies, the theory was put into practice.

With sound dental society administration and supervision, many plans have been brought to successful fruition. Their feasibility and the rules for their operation have been well established. Their value as a mechanism for increasing the distribution of dental care in the interests of the dental health of the public has been demonstrated. They have been endorsed by the public and the profession with enthusiastic support and utilization.

For some time to come, a larger segment of the population will benefit from budget payment plans for meeting the costs of dental care than will benefit from plans for the group purchase of such care.

The plans surveyed in the preparation of this report are listed below.

Budget payment plans for the purchase of dental care have been reported by the following dental societies in Association correspondence or questionnaires since 1953:

Constituent:
- Arkansas State Dental Association
- California State Dental Association
- District of Columbia Dental Society
- Georgia Dental Association
- Nevada State Dental Society
- Oklahoma State Dental Association
- Oregon State Dental Association
- Rhode Island State Dental Society
- Wisconsin State Dental Society

Component and local:
- Alabama—First District Dental Society (Mobile)
- Southern California—Orange County Dental Society (Santa Ana)
- Los Angeles County Dental Society
- San Diego County Dental Society
- Tri-County Dental Society (San Bernardino)
- Connecticut—Bridgeport Dental Association
- New Haven Dental Association
- Florida—Tampa Dental Study Club
- Illinois—Chicago Dental Society
- Springfield District Dental Society
- Indiana—Indianapolis District Dental Society
- Michigan City Dental Society
- Kansas—Wichita Dental Society
- Kentucky—Louisville District Dental Society
- Maryland—Southern Maryland Dental Society (Bethesda)
- Massachusetts—Lynn Dental Society
- Michigan—Southwestern District Dental Society (Battle Creek)
- Detroit District Dental Society
- Genesee County District Dental Society (Flint)
- Kalamazoo Valley District Dental Society
- Central District Dental Society (Lansing)
- Oakland County District Dental Society (Pontiac)
- Saginaw Valley District Dental Society
- Mississippi—Central District Dental Society (Jackson)
- Missouri—Kansas City District Dental Society
- St. Louis Dental Society
- Montana—Butte Dental Society
- New Mexico—Albuquerque District Dental Society
- New York—Third District Dental Society (Albany)
- Erie County Dental Society (Buffalo)
- Seventh District Dental Society (Rochester)
- Fourth District Dental Society (Schenectady)
- Ohio—Akron Dental Society
- Cincinnati Dental Society
- Pennsylvania—Philadelphia County Dental Society
- Odontological Society of Western Pennsylvania (Pittsburgh)
- Reading Dental Society
- Tennessee—Third District Dental Society (Chattanooga)
- Sixth District Dental Society (Columbia)
- Memphis Dental Society
- Nashville Dental Society
- Texas—Panhandle District Dental Society (Amarillo)
- Austin District Dental Society
- Brazos Valley District Dental Society (Bryan, Hearne)
- Nueces Valley District Dental Society (Corpus Christi)
- Dallas County Dental Society
- Fort Worth District Dental Society
- Sabine District Dental Society (Port Arthur, Beaumont)
- San Antonio District Dental Society
- Central Texas District Dental Society (Waco)
- Wichita District Dental Society (Wichita Falls)
- Utah—Provo District Dental Society
- Salt Lake District Dental Society
- Weber County Dental Society (Ogden)
- Virginia—Northern District Dental Society (Arlington)
- Richmond Dental Society
- Washington-Seattle District Dental Society

Other sources of information on budget payment plans that dental societies may find useful include the books, *Installment Credit,* issued by the American Institute of Banking, Section, American Bankers Association, 12 E. 36 St., New York 16, and *Postpayment Plan Progress,* issued by the Los Angeles County Dental Society. The latter is a statistical and philosophical report regarding the activities of the society's budget payment plan from October 1950 to May 1956, prepared by S. Mayo Silverman. It can be obtained from the Los Angeles County Dental Society, 903 Crenshaw Blvd., Los Angeles, 19.

COUNCIL ON FEDERAL DENTAL SERVICES

Authorized civilian dental care for active duty Air Force personnel

The Council on Federal Dental Services has received recently the latest policy statement of the Department of the Air Force concerning the procedures to be followed in effecting settlement of accounts for authorized medical care and allied services rendered active duty military personnel by civilian dentists. The dissemination of this information to the membership, it is hoped, will eliminate misunderstandings concerning what dental treatment is authorized to be provided at government expense, and how to go about collecting the fee for the services provided. It should be recognized that this report is entirely unrelated to dental care provided to dependents of military personnel under the Dependents' Medical Care Act. It pertains exclusively to treatment rendered active duty military personnel.

In nonemergency cases, treatment in civilian facilities is authorized only when there are no federal dental treatment facilities available. Such a situation is not very likely, but should it exist, the nonemergency treatment must be authorized by the serviceman's commander.

In cases of emergency, dental treatment in civilian facilities is authorized for servicemen on duty, leave or liberty without prior approval of the military authorities when the dental treatment is necessary to prevent undue suffering, to relieve acute septic conditions, or to treat dental injuries caused by direct violence. These dental services may be rendered either in a hospital or in the dental office. If possible, the proper military authorities should be notified promptly by wire or telephone before treatment, or immediately after treatment where prior notice is not deemed practicable. The proper person to notify is the commander of the nearest Air Force base. Such notification should include the patient's name, rank, serial number, organization, nature of illness or injury and a statement of the practicability of transfer of the patient to a military hospital if hospitalization is required.

The statement for services provided should be tendered to the commander of the nearest Air Force base. Such statements should be prepared in quadruplicate and include the patient's full name, rank, serial number, duty status (leave, liberty or duty), diagnosis, dates on or between which services were rendered and an itemization of all charges. The following certification must appear on each statement:

> I certify that the above charges are correct and just; that payment therefore has not been received; that the services were necessary in the care and treatment of the person above named; that the services were rendered as stated; and that the charges do not exceed those customarily charged in this vicinity.
>
> _____ _____
> (Signature of payee) (Title)

The adherence to the procedures outlined herein will expedite the processing of accounts rendered to the Air Force for treatment of Air Force personnel and eliminate much unnecessary aggravation for both the dentist and the service.

Attention is again called to the fact that the foregoing information does not pertain to the rendering of dental treatment to dependents of military personnel, but only to the active duty personnel themselves.

BUREAU OF PUBLIC INFORMATION

Dental societies show increasing interest in public relations

The increasing interest of dental societies in public relations is evidenced by the large number of requests for two new handbooks recently published by the Bureau of Public Information of the American Dental Association. The handbooks, each concerned with a different aspect of public relations, are *Publicity for Dental Societies* and *Television Manual.*

The publicity manual is a 24 page booklet. Its ten chapters describe how publicity can be used effectively in a dental society's relations with the public. The booklet was commended in a review in a recent issue of *Public Relations News,* a leading public relations publication for executives.

The review prompted widespread requests for the publicity manual from officials of numerous organizations and agencies outside the dental field, including insurance companies, medical organizations, telephone companies, drug associations and other groups. Thus, one indirect effect of the manual has been dissemination of information about the American Dental Association and its network of constituent and component societies.

Similarly, the television manual, a handbook designed for local, district and state dental societies interested in presenting programs on local television stations, has been widely distributed and excerpts from it have appeared in various trade publications.

In addition to providing information on planning and giving programs, the 24 page television manual describes facilities of the Association, and the films and scripts which are available to dental societies for television use.

Following is the comment from *Public Relations News* regarding the booklet, *Publicity for Dental Societies:*

> The American Dental Association (Chicago) has just issued a publicity manual for the benefit of its state and local societies—one which can be studied to advantage. Because the concept of public relations and techniques of publicity still are new to many of the Association's members, the 24 page booklet is elementary and easy to follow. It begins by differentiating between PR and publicity and makes the sound comment that there is need for a continuing program of publicity operating within the framework of sound PR. It recommends setting up a publicity committee . . . describes what makes news (regular and special meetings, workshops, speeches, surveys, public service activities, etc.) . . . tells how to prepare publicity material and work with the media (select a spokesman; news stories should stand on their merits; etc.) . . . offers picture ideas . . . suggests use of other material (pamphlets, posters, contests, and films) . . . and urges measurement of results through attitude surveys.
>
> In summarizing, the guide gives an excellent over-all statement of the purpose of publicity: "In the final analysis, publicity should be evaluated in relation to the basic objectives of the society to improve the health of the public and to promote the art and science of dentistry. Publicity which serves this purpose is useful and highly desirable."

Sample copies of both the publicity and television manuals are available without charge for use by dental society officials. There is a small charge for quantity orders.

COUNCIL ON DENTAL THERAPEUTICS

Penicillin and postextraction bacteremia—an informative report

Transient bacteremia frequently follows surgical manipulation associated with removal of teeth. Gram-positive organisms, chiefly streptococci and staphylococci, are most predominant in the blood cultures drawn for study in these situations.[1,2] More recent studies indicate that the gingival crevice is an important site from which bacteria gain entrance into the blood stream,[3,4] and suggest that bacteremia may follow periodontal treatment in certain instances.

In the patient with an acute dental infection, it is usually desirable to bring the infection under control before exodontic or other surgical procedures are undertaken. This may require antibiotic therapy for several days before the operation is performed.

Antibiotic prophylaxis against the effects of bacteremia is of critical importance in the patient with a history of rheumatic fever, rheumatic heart disease or a congenital heart defect, because in these individuals, the bacteria may lodge in the valvular structures and lead to the development of subacute bacterial endocarditis.

Penicillin continues to be recognized as the drug of choice for prophylaxis against subacute bacterial endocarditis. Penicillin is bactericidal rather than bacteriostatic toward the gram-positive organisms associated with the disease, especially the streptococci. Because penicillin G (benzyl penicillin) is absorbed erratically and unreliably from the digestive tract, the Council on Dental Therapeutics has recommended intramuscular injection of the drug for maximum assurance of adequate serum concentrations. Reports of experience with penicillin V (phenoxymethyl penicillin) indicate that oral preparations of this drug provide comparable serum concentrations, and may serve as an adequate alternative in the instances in which parenteral administration of penicillin is not feasible.

It has been shown by Welch[5] and by other investigators[6-8] that, after orally administered phenoxymethyl penicillin, the blood concentration of penicillin compared favorably with that obtained from intramuscular injections of comparable dosages of penicillin G. Quinn and others, in a series of reports,[9,10] found that orally administered phenoxymethyl penicillin was also effective in the treatment of subacute bacterial endocarditis. Other streptococcal infections, including scarlet fever, streptococcal pharyngitis, and lobar

1. Okell, C. C., and Elliott, S. D. Bacteremia and oral sepsis with special reference to etiology of subacute endocarditis. Lancet 2:869 Oct. 19, 1935.

2. Shroff, F. R. Post-operative bacteremia. New Zealand D. J. 41:8 Jan. 1945.

3. Burket, L. W. Oral medicine, ed. 2. Philadelphia, J. B. Lippincott Co., 1952, p. 192.

4. Bender, I. B., and Pressman, R. S. Antibiotic treatment of the gingival sulcus in prevention of postextraction bacteremia. J. Oral Surg. 14:20 Jan. 1956.

5. Welch, H. Phenoxymethyl penicillin (penicillin V). Antibiotic Med. 2:1 Jan. 1956.

6. Cox, F., Jr., and others. Further observations on the use of large doses of oral pencillin V (phenoxymethyl penicillin). Antibiotics annual: 1956-1957. New York, Medical Encyclopedia, Inc., 1957, p. 282-286.

7. Putnam, L. E., and others. Penicillin blood concentrations following oral administration of various dosage forms of penicillin V and comparison with penicillin G. Antibiotics annual: 1955-1956. New York, Medical Encyclopedia, Inc., 1956, p. 483-487.

8. White, A. C., and others. Absorption and antimicrobial activity of penicillin V (phenoxymethyl penicillin). Antibiotics annual: 1955-1956. New York, Medical Encyclopedia, Inc., 1956, p. 490-500.

9. Quinn, E. L., and others. Phenoxymethyl penicillin (penicillin V) therapy of subacute bacterial endocarditis. J.A.M.A. 160:931 March 17, 1956.

10. Quinn, E. L., and others. Oral phenoxymethyl penicillin (penicillin V) in the treatment of subacute bacterial endocarditis: preliminary report. Antibiotics annual: 1955-1956. New York, Medical Encyclopedia, Inc., 1956, p. 502-504.

pneumonia, responded favorably to orally administered phenoxymethyl penicillin.[11-13] Not only was the clinical effectiveness of phenoxymethyl penicillin similar to that of penicillin G, but the oral administration of phenoxymethyl penicillin was, at times, considered to be more efficient because of the higher serum levels obtained.[14]

In the light of current information, the Council has recognized the prophylactic usefulness of penicillin V when administered in adequate oral doses as an alternative to the parenteral injection of penicillin G for the prevention of postoperative bacteremias.

The Council suggests certain considerations as minimum precautionary measures against the hazards of subacute bacterial endocarditis.

Before penicillin therapy is started, the patient should be questioned to ascertain whether there may be a predisposition toward penicillin sensitivity. If there is a history of hay fever, allergy, asthma or previous reaction to penicillin, erythromycin or a broad-spectrum antibiotic should be employed instead. The actions, uses and doses of these drugs are discussed in *Accepted Dental Remedies*. The following dosage schedules are suggested:

Treatment of Choice • About one-half hour before operation, the patient should receive intramuscularly 200,000 to 300,000 units of crystalline penicillin G with 600,000 units of procaine penicillin G. Postoperatively, the patient should receive an additional injection of 600,000 units of procaine penicillin intramuscularly 18 to 24 hours later. If this is not feasible, the patient should receive at least 200,000 units of an oral form of penicillin every 4 to 6 hours during the ensuing 48 hour period. Buffered penicillin G, benzathine penicillin G or a penicillin V preparation may be employed for this purpose.

Alternative Treatment • At least 24 hours before operation, the patient should begin receiving 200,000 to 300,000 units of penicillin V orally every 4 to 6 hours. A 200,000 unit dose should be administered one hour before the operation, and postoperatively 200,000 to 300,000 units should be given four times a day for the ensuing 48 hours.

11. Breese, B. B., and Disney, F. A. Penicillin V treatment of beta-hemolytic streptococcal infections in children. Am. J. Dis. Child. 92:20 July 1956.

12. Wehrle, P. F., and others. Penicillin V therapy of scarlet fever and acute streptococcal pharyngitis: clinical and serologic response. Antibiotics annual: 1956-1957. New York, Medical Encyclopedia, Inc., 1957, p. 294-299.

13. McWhorter, H. B., and others. The treatment of moderate and severe lobar pneumonia with oral penicillin V. Antibiotics annual: 1956-1957. New York, Medical Encyclopedia, Inc., 1957, p. 300-305.

14. Wood, W. S., and others. A clinical evaluation of oral penicillin V therapy. Antibiotic Med. & Clin. Therap. 3:38 June 1956.

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The American Dental Association, through its various agencies, assists the dentist by providing him with suitable dental educational materials for use in his practice. The Film Library has been collecting films and slides that can be used in the dental office to give general basic information that will supplement the information regarding specific conditions. This will reduce the length of time needed to instruct patients and will increase their knowledge regarding dentistry in general.

A listing of these films and slides can be found in the printed Supplement I and in the new Mimeographed Supplement II to the booklet, *Audio-Visual Materials in Dentistry,* all of which can be obtained free of charge from the Film Library, Bureau of Library and Indexing Service, 222 E. Superior St., Chicago.

General information regarding the new automatic slide projectors and film equipment that are suitable for use in the dental office can be found on pages 28 and 29 of Supplement I. These projectors may be set up in the reception room, and will require attention by the dental assistant only at brief intervals.

The Film Library is interested in increasing its collection of audio-visual materials that can be used for the education of patients. Readers who have such material can obtain preview application forms from the Film Library.

The film reviewed in this article, "Teeth, Health and Appearance," was shown on the recent annual session motion picture program. It is now available for rental ($2.50) from the Film Library.

FILM REVIEW

Teeth, Health and Appearance • 16 mm., black and white, sound, seven minutes. Cleared for television. Produced in 1957 by Edward J. Green, D.D.S. Photography by Mel Horace, Productions on Films, Cleveland. Can be purchased ($35) from Dr. Green, 3697 E. 131 St., Cleveland 20.

The setting of the film is the dental office. The dentist, throughout the film, discusses and explains various dental facts to the parents of one of his patients, six year old Robert. The questions asked by the parents on the importance of deciduous teeth, the proper age at which to begin dental care, and on the use of space maintainers, are answered by the dentist who uses the booklet, *Teeth, Health and Appearance,* issued by the Bureau of Dental Health Education, American Dental Association. This booklet is available from the Order Department of the Association.

Although the film is not outstanding in its presentation and the dialogue is somewhat stilted, it is one of the few films showing dental education of parents. Practitioners will find it suitable for use in the dental office and for presentation before Rotary Clubs, P.T.A. and other community groups.

Book Reviews

KLINISCHE PHYSIOLOGIE UND PATHOLOGIE (CLINICAL PHYSIOLOGY AND PATHOLOGY)

By Ferdinand Hoff. Fifth edition. 1,120 pages with 255 illustrations. Index. DM. 79.50. Stuttgart, Georg Thieme Verlag, 1957.

The first edition of this textbook appeared in 1950. It became clear to the author that science, including medicine and dentistry, has made such progress and has become enlarged to such an extent that it has become exceedingly difficult for one person to encompass the entire sphere. Therefore, specialists were called on to contribute chapters on their particular branches of the profession. Some contributors have stressed anatomic pathology, including histopathologic alterations; others have correlated pathologic findings with physiologic and clinical changes. Some have stressed nutritional, functional and chemical alterations.

Hoff's book can be used as a text for dental and medical students under the guidance of understanding teachers in physiology and pathology. Graduate students as well as trained practitioners will find in it valuable information on numerous subjects.

The reproductions are good and illustrate the essential problems. The book can be recommended because it provides information on a variety of subjects that are important to every dentist and physician. Furthermore, its contents will be of interest to all levels of the profession from the student to the researcher. It should be on the shelves of every dental and medical library and of practitioners interested in the scientific study of disease.

Paul H. Glucksman

TASCHENBUCH DER ANATOMIE (MANUAL OF ANATOMY)

By Hermann Voss and Robert Herrlinger. Eighth edition. Three volumes. 1,022 pages with 547 illustrations. Index. DM. 30. Jena, VEB, Gustav Fischer Verlag, 1956.

This pocket edition of Voss and Herrlinger's important textbook of anatomy offers much more than the reader would expect from the title. The clear and concise style has made possible the inclusion of voluminous material rarely found in other pocket editions of scientific textbooks.

Written in an unusually simple and clear German, its contents are based on sound knowledge and teaching experience. It contains precisely what the practicing physician or dentist wants and needs rather than the customary profound scholarly observations which appeal only to the researcher.

This text can be recommended as a reference work for dental and medical students and for general practitioners. It is excellently produced, printed and illustrated and, for a work of more than 1,000 pages, it is relatively small and easy to handle. The type and paper are adequate; in brief, this book is easy to read.

John P. Herrick

ZAHNÄRZTLICHES TASCHEN-JAHRBUCH 1957 (DENTAL POCKET YEARBOOK 1957)

Edited by Evgen Wannenmacher. Fourth edition. 574 pages with 120 illustrations. Index. DM. 8.50. München, Richard Pflaum Verlag, 1957.

This book is a symposium of the views of prominent German dental specialists and academicians on current methods of diagnosis, prevention of diseases and new methods of treatment. Eight contributors have provided chapters, each of which deals with either pathologic conditions or problems encountered in dental and clinical practice.

Most of these chapters are accompanied by references for collateral reading. A general index is provided on the first pages, with principal page references in boldface type.

For the most part the discussions are critical and are written with the simplicity and clarity of style for which American and not German authors are noted. In some instances, however, the comments seem to be directed more toward dental students than toward experienced practitioners.

The employment of German trade names and generic terms in reference to certain drugs limits the usefulness of this book for American readers. Moreover, the book does not mention some of the newer drugs known to the American dentists and, therefore, cannot be regarded by American dental practitioners as entirely representative of current knowledge in dentistry.

These comments should in no way detract

from the general merit of this pocket-size book, and it should be read by all who contemplate studying the progress of German dentistry.

John P. Herrick

NEUES AUS DER ZAHNHEILKUNDE: ZEITSCHRIFTENREFERATE AUS DEN JAHREN 1954-1955 (PROGRESS IN DENTISTRY: ABSTRACTS FROM DENTAL LITERATURE 1954-1955)

Edited by A. Franzen. Third edition. 440 pages with 140 illustrations. Index. DM. 16. Hannover, Schlütersche Verlagsanstalt, 1956.

This collection of abstracts from the international (mainly German) dental literature published during 1954-55 consists of more than 2,500 entries covering general dentistry, oral surgery, conservative and prosthetic dentistry, orthodontics, roentgenology and radiology, dental and laboratory technics and dental materials. An extensive bibliography is included.

Despite the inclusion of much material that only by a stretch of the imagination can be said to pertain to dentistry, this volume, the third of its kind, includes excellent reviews and discussions of many topics of current interest to dental editors and librarians.

The book is well printed and bound, but inadequately illustrated, and a more complete subject index would have been helpful. It is hoped that subsequent volumes will limit the number of articles abstracted and will discuss the articles selected in greater detail.

Paul H. Glucksman

PARTIAL DENTURES: A PRACTICAL TEXTBOOK

By Kenneth P. Austin, D.D.S., and Ernest F. Lidge, Jr., D.D.S. 227 pages with 165 illustrations. Index. $9.50. St. Louis, C. V. Mosby Co., 1957.

The first three of the five parts describe, step by step, the procedures involved in constructing a removable partial denture. Beginning with the initial examination of the patient, the text continues with a description of the work done by the commercial laboratory for the dentist and carries through to the final examination by the dentist.

Part four of the book describes immediate partial dentures, duplications, relines, rebases and repairs. The material contained in part five is self-explanatory from the title, "Trouble Shooting."

Conspicuously missing, as in most present day books on removable partial dentures, is any mention of the precision attachment type of denture. In this reviewer's opinion there is little factual substantiation for the use of a removable upper partial denture in preference to fixed bridgework in the practical example described in the text.

The author has handled his subject matter well, has it logically organized, well illustrated and his style is easy to read.

The publisher is to be complimented on the quality of the paper and binding as well as on the choice of type size.

Although this book does not contain any new information, it might well be used as a text for undergraduate teaching or as a reference book for the practicing dentist.

Monte G. Miska

DIE ZAHN-, MUND- UND KIEFER-HEILKUNDE: EIN HANDBUCH FÜR DIE ZAHNÄRZTLICHE PRAXIS (THERAPY OF THE TEETH, MOUTH AND JAWS: A MANUAL FOR DENTAL PRACTICE)

Edited by Prof. Karl Häupl, Prof. Wilhelm Meyer and Prof. Karl Schuchardt. For sale in complete set only. DM. 650. München, Urban & Schwarzenberg, 1954-1957.

Issue 24 contains parts of volume IV (Dental Prosthetics).

TECHNICS USED IN DENTAL LABORATORY WORK • By Prof. L. G. Mathé. 158 pages with 416 illustrations.

The author presents a straightforward systematic outline of the fundamentals in dental laboratory work and dental prosthetics. By omitting much historically interesting data, considerable space is saved. Although it might be questioned whether this is the most useful or practical method of approach, it can be admitted that a surprisingly large amount of information is presented in a logical, accurate and scholarly manner. For readers who desire further information, a reference list of selected recent reviews covering the theoretical and practical aspects of the various topics is given.

Despite its comparatively small size, this contribution covers most of the important topics. The illustrations, many of them in multiple colors, are excellent.

Issue 25 contains parts of volume III (*General and Special Surgery of the Oral Cavity and the Jaws*).

CONTROL AND ELIMINATION OF PAIN • By Prof. Karl Schuchardt and Fritz Schön.

This article, concluded in this issue, has been reviewed previously.

LOCAL ANESTHESIA • By Prof. Karl Schuchardt. 147 pages with 96 illustrations.

This contribution on local anesthesia in dental practice is a useful addition to dental literature. Students, teachers and practitioners today need information on a variety of new methods and drugs which have been made available through recent research. Immediately after new ideas or substances are found to have practical use in dental anesthesia, the profession is introduced to new terms. The information available frequently contains only detailed chemical data which are not generally needed for the practicing dentist unless he has a special interest in the purely chemical aspect of the medium. The researchers, however, usually prefer to study the original publications.

To meet these divergent needs, the author covers each topic in a manner which permits the available evidence to be presented clearly, and then interpreted, evaluated and even criticized scientifically.

The illustrations are instructive and well reproduced. The text is easy to read because it is written in a delightful and modest way; the subject index is well organized and appears to be complete.

Issue 26 also contains parts of volume III.

TOOTH EXTRACTION • By Prof. Fritz Brosch. 47 pages with 87 illustrations.

This comparatively brief article on tooth extraction contains information on indication and contraindication, surgical methods, instruments, premedication, postoperative complications, and prevention of postoperative infection.

The author recommends preservation of teeth whenever possible because of the functional importance of the tooth structure and mechanics and the relation between teeth and oral musculature.

A brief description of clinical aspects accompanies each case report. This unusually well-written and excellently illustrated contribution presents the essential points of the extraction therapy, used for orthodontic purposes, in an easily understandable form.

Although many readers will find much in this article that appears to be familiar, there is a fresh approach to many problems.

APICOECTOMY • By Prof. Fritz Brosch. 25 pages with 38 illustrations.

The author's discussion covers not only the mechanism of apicoectomy but the preoperative infectious process, the resistance of the invading microorganisms and that of the oral tissues, the changing degree of virulence of the infecting agents, the usual and unusual surgical procedures and the various postoperative treatment methods.

Because of the author's clinical experience and the completeness of his coverage of material not previously presented, this article appears to be a valuable addition to the knowledge of the conditions in which apicoectomy is indicated.

The good illustrations are helpful and provide relief in a text which seems to be too crowded for reading comfort.

CYSTS IN MAXILLOFACIAL REGION • By Prof. Fritz Brosch. 52 pages with 94 illustrations.

One of the justifications for writing such an essay on cysts in the regions of the face or the jaws is that it brings practicing dentists up-to-date on recent methods. To this end the author has laid a special emphasis on operative technics which can be employed successfully in routine dental practice. Dentists, graduate and undergraduate students will find this essay valuable and helpful.

SURGICAL TREATMENT OF MARGINAL PERIODONTITIS • By Prof. Eugen Fröhlich. 21 pages with 16 illustrations.

In this article the author discusses the result of surgical treatment of marginal periodontitis. The first chapter deals with anatomic considerations; the second is devoted to information gained from the writings of leading oral surgeons on this subject; in the third, diagnosis and the various factors which are important in determining the operability in each instance are discussed; in the fourth the advantages and disadvantages of the different operative procedures are discussed, and in the last part a comprehensive presentation is given of preoperative and postoperative care.

With final emphasis on an early diagnosis the author concludes his splendid, well-illustrated article.

Issue 27 also contains parts of Vol. III.

PERIPHERAL AND CENTRAL GRANULOMAS IN THE REGION OF THE JAWS • By Prof. Gerhard Steinhardt. 13 pages with 5 illustrations.

The author discusses various forms of oral granulomas. *In vivo* observations are substantiated by painstaking *in vitro* experiments. The rather short article treats therapeutic and surgical procedures comprehensively. Emphasis is given to general management rather than to a mere enumeration of drugs. This may serve as a basis for rational and critical judgment of all therapeutic agents to be used in treatment of oral granuloma. The article contains a vast amount of useful information written in easily understandable language.

DYSTROPHY OF THE JAWS • By Prof. Gerhard Steinhardt. 15 pages with 14 illustrations.

This is a detailed study of dystrophic alterations in the jaws. Interwoven in its pages are instructive comments on all phases of these pathologic conditions and valuable references to the literature. This adds a great deal to the value of this paper for practicing dentists and students, but it is likewise useful for researchers who wish to use the article for reference. There is no doubt that Steinhardt's contribution will meet with favor among the members of the dental profession.

PATHOLOGIC CHANGES IN THE TEMPOROMANDIBULAR JOINT • By Prof. Gerhard Steinhardt. 55 pages with 28 illustrations.

This rather detailed monograph on pathologic changes in the temporomandibular joint is well presented, profusely illustrated and reveals a profound understanding of the subject matter. Although some of the opinions presented are at variance with those generally accepted in this country, the rationale of the conclusions reached by the author is of interest. His classification of temporomandibular joint disorders is relatively simple and avoids the complexities of some other systematic arrangements. The article fails, however, to include statistical data to corroborate the findings, nor are there any reports of biochemical studies to confirm some of the author's statements.

SURGICAL ORTHODONTICS • By Prof. Aloys Immenkamp. 59 pages with 176 illustrations.

This article was written with a twofold purpose. The first was to present nonsurgical methods for prevention and correction of irregularities of teeth and jaws and malocclusions; the second was to evaluate the etiologic importance of those conditions and to determine the operability. An extensive review of the literature is included. The orthodontist will be particularly interested in Immenkamp's contribution because the author's specialized training enables him to evaluate critically this type of material. This present study clarifies much of the confusion which now exists as to whether in certain instances surgical orthodontics is preferable to nonsurgical methods.

Issue 28 also contains parts of volume III.

TRAUMA IN OSSEOUS TISSUES OF THE FACE AND THE JAWS AND IN THE SURROUNDING SOFT TISSUES • By Prof. Erwin Reichenbach. 135 pages with 210 illustrations.

This is a comprehensive and well-written article that presents all aspects of injuries to osseous and soft tissues of the face and the region of the jaws. The anatomy, physiology, pathology, and experimental work are fully discussed. Reasonable criteria of operability in certain instances are outlined. Several treatment methods are presented with thoroughness and balanced judgment. The responsibilities of dentists and oral surgeons, the psychologic impact on patients, the important factors of after-treatment care, including physical and psychologic rehabilitation, are discussed with understanding. The illustrations are of good quality, and the bibliographies extensive and up-to-date.

Paul H. Glucksman

BIOCHEMICAL DISORDERS IN HUMAN DISEASE

By R. H. S. Thompson and E. J. King. 843 pages with 121 illustrations. Index. $12.50. New York, Academic Press, Inc., 1957.

This book assembles, presents and analyzes some of the known facts concerning the chemical basis underlying human disease. In a sense it extends our understanding of the pathogenesis of disease from classical cellular and organ pathology into the realm of chemical pathology. The subject matter is presented on an "organ basis" so that this might indeed be thought of as a text in "chemical organology." The book was written primarily for the biochemist and for the physician interested in the biochemical disorders in disease. Although the book does not deal with specific dental diseases, it should be of value to those engaged in dental research, oral pathology and oral medicine.

The book is written by several authors, each an expert in his field. Of particular interest are the chapters dealing with disorders of the gastrointestinal tract by D. A. K. Black, diseases of bone and the parathyroid gland by Russell Fraser and E. J. King, and connective tissue disorders by E. G. L. Bywaters and L. E. Glynn.

The material is clearly presented and liberal use is made of illustrations, tables, and graphs. The references at the end of each chapter, and both the author index and subject index are excellent.

Leo M. Sreebny

LEHRBUCH DER CHIRURGIE
(TEXTBOOK OF SURGERY)

Edited by H. Hellner, R. Nissen and K. Vossschulte. 1,059 pages with 596 illustrations. Index. DM. 84. Stuttgart, Georg Thieme, 1957.

This monumental and up-to-the-minute work is not so much a description of surgical procedures and operative technics as it is a well-rounded presentation of the underlying principles on which the practice of surgery is based. Pathophysiology and clinical and surgical aspects of disease are stressed, whereas questions of operative technic are covered briefly. Although the text is supported by well-chosen diagrams, photographs and roentgenograms, the editors have kept the number as small as possible. It is their teaching philosophy that visual representations should not predominate lest they serve to promote intellectual laziness, a danger to which they feel the practicing physician is exposed to a considerable degree. Only a relatively few of the illustrations are borrowed from other sources; the majority of the illustrations appear for the first time in this book.

A textbook which so thoroughly and authoritatively covers all fields of surgery could not have been written by one person or even a few co-authors. In this book, the editors have combined their own contributions with those of 30 co-workers, mostly professors and directors of university clinics in many chief cities in Germany and Switzerland. In such a great joint effort it is not surprising that various interpretations and theories of disease processes are presented. The editors do not object to this for the student and the physician are thereby stimulated to take a personal point of view and to make a critical comparison—"a condition, which appears to us particularly important."

Of the 23 chapters which comprise the book, the first 12 are on more general and basic aspects of the subject, including the development of surgery, wound healing, hemorrhage and transfusion, infections, tumors in general, use of radioisotopes, shock, thrombosis and embolism, anesthesia, plastic surgery and transplantation, surgical technic and pathophysiology related to surgical treatment.

The remaining chapters consider surgery of particular systems, such as the nervous, circulatory and urogenital systems, and of the extremities, head and face and neck. These chapters in turn, mostly are subdivided into logical sections, each of which may be written by a different specialist. The chapter on the abdomen, for example, has ten subdivisions prepared by eight of the contributing authorities. The subject of each subdivision, then, is usually considered under such headings as history, anatomy, physiology, pathophysiology, congenital anomalies and diagnosis and therapy, and the disorders of the system or particular organ are considered also.

Some notion of the completeness of the coverage may be gained by noting that the table of contents in outline form covers 36 pages. Each chapter and subdivision is well-documented by references to the literature, both classic and recent (1956). The typography, paper, illustrations and binding are typical of the high standards of publishing maintained by Georg Thieme. Considering the large number of contributors, the text is surprisingly uniform in its readability and conciseness.

The comprehensive coverage, fine illustrations and emphasis on fundamentals of anatomy, physiology and pathology should make this book a valuable addition to any surgeon's library, regardless of his specialty. It is well worth any additional effort that is required to read the German text.

Vernon E. Krahl

Current Literature

THE SURGICAL TREATMENT OF TRIGEMINAL NEURALGIA

Wallace B. Hamby. J. Internat. Coll. Surgeons. 26:305 Sept. 1956.

A modern surgical approach can be used for the treatment of trigeminal neuralgia or tic douloureux, which permits the relief of pain without anesthetizing the face in approximately 70 per cent of patients.

Trigeminal gangliolysis, exposing and enlarging the foramens ovale and rotundum, and decompression of the trigeminal nerve produce a mortality rate of about 0.5 to 1.5 per cent in patients, even in the advanced age brackets.

The long term effects of these newer operations are not yet known, but they do not produce facial paralysis, except temporarily in 2 to 3 per cent of the patients. The cosmetic results are good, with no deformity.

The operation, though requiring precision, usually can be performed in from 20 to 45 minutes. Patients usually are able to leave the hospital on the fifth postoperative day.

Jabe Z. Walker

FRACTURE EXPANSION OF THE MAXILLAE FOR THE TREATMENT OF ALVEOLAR COLLAPSE IN PATIENTS WITH CLEFT PALATE

William M. Adams. J. Internat. Coll. Surgeons. 26:354 Sept. 1956.

A technic has been developed for the treatment and management of the extremely underdeveloped palate and dental arch, which may be employed for patients who fail to respond satisfactorily to conservative methods. The postsurgical treatment is carried out with the cooperation of the orthodontist and prosthodontist.

Alveolar collapse is one of the frequent problems encountered in the surgical treatment of the cleft palate. The orthodontist can accomplish only minor improvement by changing the position of the teeth, and the prosthodontist likewise by compromising with an overlay prosthesis, with extraction and full dentures.

The surgical technic might be called the fracture expansion of the maxilla. It creates a complete bilateral horizontal fracture of the maxilla and a vertical fracture through the site of the old cleft in the hard palate. This facilitates a lateral shift of the maxilla to any desired position.

Immobilization is produced with orthodontic splints. After completion of the orthodontic treatment, the patient is referred to the prosthodontist for construction of a permanent prosthesis if indicated and to provide fullness and normal contour to the upper lip and closure of any cleft of the hard palate.

The data reported are based on seven patients with complete cleft lip and cleft palate who had extreme underdevelopment of the maxilla with collapse of the upper dental arch. Application of the technic resulted in considerable improvement of function and appearance in each case.

Jabe Z. Walker

A REVIEW OF LITERATURE ON ORTHODONTIC THERAPY

K. Reitan and R. Selmer-Olsen. Internat. D. J. 6:491 Dec. 1956.

In a review of recent orthodontic literature, the material may be conveniently divided into the following sections: (1) preventive methods and early orthodontic treatment, (2) fixed appliances, (3) removable appliances, (4) other methods and combinations of orthodontic methods, and (5) current views on treatment and retention problems.

1. Most authors now stress the need for learning to control the extrinsic factors which may lead to the development of malocclusion. Brodie, Sannerud, Nord, Anderson, Kjellgren and others advocate the use of simple methods for early correction of muscular dysfunction, protrusion, and various forms of cross-bite. Serial extraction of deciduous teeth is suggested as a means of simplifying treatment.

2. Various authors describe modifications in the application of the edgewise appliance, the universal appliance, the thin wire appliance, and the labiolingual appliance. Generally speaking, there seems to be a trend toward simplification of appliances. Some authors (Ohlson and Kling) point out that the incidence of caries is still one of the complicating factors in practical orthodontics. Bach's observations, however, are to the contrary.

3. Variations in construction and results obtained by the use of removable appliances are discussed. (Activators are described by

Eschler, Petrik, Koller, Schwarz, Björk and others. Bimler describes his elastic functional appliance, which is somewhat less bulky than the usual activator.)

4. Harvold, Böhn, Kettle, Brückl and McNeil report on various aspects of the problem of orthodontic treatment for patients with cleft palates. Other authors describe methods for treating impacted cuspids and for increasing the stability of the lower arch prior to the application of intermaxillary elastic force.

5. Macapanpan, Weinmann, Brodie and Björk, among others, have investigated the histologic changes after tooth movement. These studies verify that great variation exists in individual growth activity. The amounts of force necessary for various tooth movements have been surveyed, as well as the possible influence of factors controlling bone metabolism on tooth movement. Jacobsen, Massler and Malone, and Phillips deal with the problems of root resorption, whereas Heimlich, Rothner and Strang mention the problem of posttreatment stability.

Frank Roark

A REVIEW OF ROENTGENOLOGY RELATED TO DENTISTRY

Le Roy M. Ennis. Internat. D. J. 6:471 Dec. 1956.

Radiation is of prime importance to both operator and patient, as the damage caused is such that constant caution is justifiable. The rules for the prevention of needless overexposure have been expounded and should be carried out by those responsible. The issue no longer is how much radiation can be received without apparent ill effects, but how little radiation may sometimes be administered with the production of definite changes, either immediately or remotely.

A study of radiation exposure in dental offices showed that one operator received 2,000 milliroentgens in only 84 seconds, whereas another operator received only 3 milliroentgens while using equipment for 1,586 seconds, an excellent example of the careless and the cautious.

For the protection of the patient it has been definitely proved that an aluminum filter of at least 1.5 mm. thickness must be used.

The various technics of roentgenography have been discussed, with particular reference to the mandibular joint. The extreme complexity brought about by the morphology of the joint itself and as a result of its anatomic position in the skull imposes technical limitations and restrictions on the roentgenographic process. Cinefluorography with the Phillips image amplifying tube in lieu of the fluoroscopic screen is discussed in its application to the study of cleft palate, mandibular joint, facial deformities and the muscles of speech.

Consideration is given to the use and technic of pantomographic roentgenology in the all around examination of the teeth in the maxilla and mandible, with the use of one film, 10 by 4 inches, placed outside the mouth.

The outstandingly important phase of modern dentistry is diagnosis; and that is the sum total and correlation of the history, the clinical observations, and the results of the various specialized methods of examination. The proper interpretation of the roentgenogram, therefore, becomes a very important phase of diagnosis. It is impossible to interpret a roentgenogram unless the operator has an exact knowledge of the normal anatomy of the region presented in the roentgenogram, and a definite knowledge of pathologic conditions, seasoned liberally with experience and good old-fashioned common sense.

Many interesting experiments on the radiation of oral tissues have been made and reported, showing that radiation causes demonstrable changes in the primary biologic unit, the cell, and that these morphologic and physiochemical changes are followed by functional alterations. Research also has been conducted on the use of radioactive isotopes which are dynamic tools for the investigation of living processes under physiological conditions.

D. Lamar Byrd

ABUTMENTS AND ATTACHMENTS IN FIXED PARTIAL DENTURES

Kenneth C. Pruden. J. Pros. Den. 7:4 July 1957.

The modern process for casting gold attachments for fixed partial dentures has made older methods obsolete. The development of fast cutting diamond instruments and carbide burs, together with high-speed engines and handpieces, has made it possible for dentists to remove tooth contour quickly and easily. New elastic and thermoplastic impression materials have given impetus to indirect methods of fabrication. Complete mouth restorations can now be made from accurate models in the laboratory with little or no reference to the patient's mouth. Finally, the development of a tooth-like, easily processed plastic material, which can be used as a veneer on anterior attachments, gives a practical solution of the esthetic problem.

These developments have resulted in a

radically new use of fixed partial denture prostheses often inappropriately termed "mouth rehabilitation." To many dentists this connotes full coverage for all teeth, multiple splinting and frequently "bite opening."

Such radical procedures have their dangers and disadvantages. The acrylic veneer materials are softer than enamel and will erode in function and with brushing. They frequently become discolored. Not enough time has elapsed to show the full extent of the material's impermanence. Caution should be used or prostheses will have to be made over. The danger of pulp damage should not be ignored. Evidence is accumulating that pulp involvements are increasing under these full coverage veneers. The tendency toward the use of multiple abutments and extensive splinting is reaching unsound extremes and has resulted in some serious periodontal problems made more serious by the difficulty of removing these extensive one-piece restorations.

Preservation of sound labial and buccal enamel through the use of properly constructed partial coverage attachments is a conservative alternative. Pinledge attachments in anterior teeth and three-quarter crowns on bicuspids and molars are more esthetic and very retentive when properly constructed. The hydrocolloid impression and stone model technic makes their use practical when extensive rehabilitation is needed. The dentist should have the ability to make all types of attachments and should select the most conservative one applicable, rather than use indiscriminately, radical though more convenient, full-coverage veneers.

A FIVE YEAR LONGITUDINAL STUDY OF THE GINGIVAL CONDITION OF A GROUP OF CHILDREN IN ENGLAND

Gilbert J. Parfitt. J. Periodont. 28:26 Jan. 1957.

Children between the ages of two and 17 years, living in an institution on the outskirts of London, were examined for gingivitis over a period of five years. Examinations of 149 boys and 106 girls were conducted at least once every six months over periods ranging from 12 to 60 months. A total of 1,120 examinations of the labial surface of the maxillary incisal gingiva were carried out. An index of gingivitis combining the P.M.A. index and a severity rating was used.

The prevalence of gingivitis in children rises from the age of three to a peak at 11 years. Between 11 and 17 years of age, the prevalence falls slightly. The severity of inflammation rises from the age of three to a peak at 13 years. Severity declines until, when the child reaches the age of 17, the score reaches the level recorded at six years. The incidence of gingivitis is highest at the age of 13 to 13½ in boys and at the age of 11 in girls. A slight seasonal variation in the incidence of gingivitis also is observable.

The figures presented suggest a high order of accuracy in the method developed for this survey.

John J. O'Malley

QUANTITATIVE EVALUATION OF THE THERAPEUTIC EFFECT OF SELECTIVE GRINDING

H. R. Muhlemann, H. Herzog and K. H. Rateitschak. J. Periodont. 28:11 Jan. 1957.

No quantitative studies are found in the literature demonstrating the therapeutic effect of selective grinding. Certain changes occur in the periodontal structures as a consequence of selective grinding. The therapeutic effect of selective grinding was evaluated by tooth mobility measurements.

By means of a periodontometer, measurements were computed before and after selective grinding. Observations were based on nine patients with unilateral masticatory function.

The results showed a considerable reduction of mobility on both the hypofunctional and the hyperfunctional sides, with an increase of mobility in both upper central incisors.

The clinical conclusions to be drawn from this study are:

(1) The reestablishment of function in hypofunctional areas should be attempted; (2) occlusal contact in the balancing areas should not be attempted, and (3) care should be taken to check the occlusion of the incisors with the jaws in centric and protrusive positions after selective grinding.

Nicholas R. Marfino

A REVIEW OF THE EPIDEMIOLOGY OF PERIODONTAL DISEASES

Charles M. Belting. J. Periodont. 28:37 Jan. 1957.

It is the purpose of the discussion to review those methods of measuring periodontal diseases and their morbidity rates. For an ideal assessment of periodontal disease, a correlation of clinical and roentgenographic observations is needed.

The roentgenogram is the most objective

tool available for epidemiological study, in spite of its limitations. Certainly the roentgenogram has the advantage of providing a permanent record which can be analyzed by some type of scale which will eliminate subjective interpretations. This is an important consideration in any survey technic.

No method has yet been developed that will enable an examiner to interpret roentgenographic findings, unless they are supported by clinical observations. The next objective in the development of epidemiological methods for the study of periodontal diseases, therefore, would appear to be a standardization and refinement of roentgenographic methods already used. Any observations should be reported as alveolar bone changes, however, not as diagnoses of periodontal disease.

The public health dentist is the logical specialist to carry forward this research as he has in the field of caries. Two courses of action appear to be indicated: first he should develop an educational program directed toward the public in general and the dental profession in particular to stimulate more adequate recognition and treatment of this insidious disease process, and, second, he should solicit the cooperation of the American Academy of Periodontology in arriving at a satisfactory criterion of assessment for further epidemiological study of this disease on a nation-wide basis. Racial, sex, endemic and dietary differences thereby may be found which will provide valuable clues to the etiology of periodontal diseases.

Anthony W. Gargiulo

PERIODONTICS FOR THE GENERAL PRACTITIONER—HIS RESPONSIBILITY IN MAINTENANCE OF PERIODONTAL HEALTH

Balint J. Orban. J. South. California D.A. 25:20 April 1957.

The general practitioner is primarily responsible for the oral health of his patient. It is his responsibility to recognize disease processes in their early stages, and to see that treatment is instituted immediately, either by himself or by a specialist. It is appalling for a periodontist to hear a referred patient say: "Why didn't my dentist tell me about this condition before? I have gone to him for years."

As the first custodian of the patient's oral health, the general practitioner must be well informed and free of prejudices. He does not have to make a final diagnosis, prognosis, or plan the treatment if he does not have the necessary background to do so. He can seek consultation.

Periodontal diseases can be classified into three groups: (1) inflammatory; (2) dystrophic, and (3) traumatic.

Probably 75 per cent of all periodontal disturbances are inflammatory, in which group are two large subdivisions based on topography. If the inflammation is localized to the gingiva, it is diagnosed as gingivitis; if it penetrates into the deeper supporting tissues, it is periodontitis. The primary etiologic factor in most inflammatory conditions is local irritation. Therapy is directed toward eliminating the irritation. Part of the preventive treatment—prophylactic root planing—can be delegated to the dental hygienist, but unfortunately, severe periodontal conditions also are often left to the care of the hygienist and the dentist has not trained her to perform this service. Many hygienists are disturbed by the fact that patients have severe periodontal lesions and the dentist does nothing about it.

If local irritation is the primary factor in 75 per cent of periodontal disease, the systemic factors play a secondary role. There is no single systemic disease that, in itself, will produce gingivitis or periodontitis. Any systemic disease, however, may aggravate a local inflammatory process. The factors causing local irritation should be eliminated first, and then dietary and nutritional deficiencies may be corrected. Systemic factors must be treated by the patient's physician. No dietary measures, vitamins, minerals or endocrine therapy can compensate for poor home care procedures.

The periodontist is concerned about the contour of fillings and crowns, contact points, embrasure shapes, the proper construction and shape of pontics, clasps and the appropriate use of dental materials in operative and prosthetic dentistry.

The remaining 25 per cent of periodontal diseases are classified among the dystrophic diseases, with three subdivisions: (1) degenerative diseases, which include gingivosis and periodontosis (this group accounts for 15 per cent of all periodontal disease); (2) atrophic diseases, including gingival recession (accounting for 5 per cent of all periodontal disease), and (3) hyperplasia (accounting for the remaining 5 per cent).

The etiology of most of the dystrophic periodontal diseases is unknown. Probably some systemic disturbance started the pathologic process. The local factors still have to be treated, pockets eliminated and proper home care instituted.

The third group of periodontal diseases are traumatic. Traumatic tissue changes are characterized by changes due to stresses beyond the physiologic tissue tolerance. Occlusal

trauma does not produce periodontal disease; it may play a secondary, aggravating role. Correction of occlusal disharmonies will not cure periodontal disease. The idea held by many dentists that occlusal trauma is a primary etiologic factor in producing periodontal disease is false and has hampered the proper understanding of this disease.

Periodontal health service is complex. It can be divided into three phases: (1) establishment of diagnosis, prognosis, and development of a treatment plan; (2) treatment and postoperative care, and (3) maintenance care. The patient has to understand that periodontal therapy and care is not one operation procedure (like an appendectomy). Constant supervision is necessary.

THE UNRECOGNIZED INTERDEPENDENCE OF DENTISTRY AND MEDICINE

J. O. McCall. J. Am. Col. Den. 24:14 March 1957.

Dentistry is a part of medicine, and physicians and dentists should work together as a team. This fact is not at present fully recognized by either profession because both fail to make the relationship of dental to general health a dynamic part of their educational programs.

A mechanism for effective integration of dental and medical services has not been developed. A new approach based on the joint thinking of leaders in both professions is needed. All known facts that attest to medicodental interdependence should be assembled and brought to the attention of medical and dental practitioners and educators. Research is needed to determine points of interdependence not now fully realized and accepted. For the most effective integration of the two professions and for the development of a common point of view, the educational programs of each should include a considerable amount of joint training.

Frank B. Trice

THE FOUNDATIONS OF THE CLEFT PALATE AND TRAINING PROGRAM AT THE UNIVERSITY OF ILLINOIS

Samuel Pruzansky. Angle Orthodont. 27:69 April 1957.

When the cleft palate program was launched at the University of Illinois in 1949, it represented the culmination of efforts dating from the '30's on the part of many individuals working in various fields.

First, there was B. Holly Broadbent and the introduction of cephalometric roentgenology—an invention of the orthodontic research industry. "The important thing, so far as our history is concerned, was the development of a scientific tool to measure the growth structures within the living head and the accumulation of data describing the normal."

As a result, there developed a movement to delay surgery on the palate until school age. Proponents of this school assumed that all operations on the palate posed a definite impediment to the growth process of the maxilla. Prosthodontists, conditioned to surgical failures, seized upon Graber's research as objective evidence for their convictions that palatal surgery was to be avoided in most instances. Some surgeons began to report on procedures for which they guaranteed no interference with growth sites.

"The quest for criteria by which clinicians may be guided in prescribing treatment for the individual patient has dominated our research interest. We are proceeding toward our goals not as individuals working in isolation, but as participants in a project whose research design is influenced by the various disciplines involved."

William F. Ford

IMPORTANCE OF HISTOLOGIC EXAMINATION OF DISEASED ORAL TISSUES

George W. Green. Mil. Med. 120:356 May 1957.

Research in dentistry to date largely has been confined to the study of dental caries and periodontics. Only cursory attention has been given to disorders of oral mucous membranes, the jaws and salivary glands.

This is natural since the incidence of caries and periodontal diseases is the most prevalent and neglect of these diseases could result in the loss of one or more teeth. However, failure to recognize malignant oral diseases can lead to death. Microscopic study of unusual lesions is the principal diagnostic aid.

Biopsy is a means by which to confirm or deny a clinical impression. Two biopsy technics, excision and incision, are useful in making a definitive diagnosis.

Although the number of patients with oral malignancies the practitioner sees is small compared with the number of patients with caries and periodontal disease, the former is the most serious problem confronting the dentist. Public health benefits obtained from the dental profession when it serves as a cancer detecting agency are immeasurable.

Theodore C. Levitas

Deaths

Abelson, Harry E., Peekskill, N. Y.; Columbia University School of Dental and Oral Surgery, New York, 1945; died August 22; aged 72.

Alexander, Avedian M., Fresno, Calif.; University of Southern California School of Dentistry, Los Angeles, 1920; died August 31; aged 62.

Allison, George W., Pittsburgh; University of Pittsburgh School of Dentistry, 1919; died March 24; aged 81.

Aronson, N. Warren, Brooklyn; New York College of Dentistry, 1918; died July 12; aged 67.

Ashley, James M., Boise, Idaho; Washington University School of Dentistry, St. Louis, 1914; died April 30; aged 67.

Bell, Donald A., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1952; died July 9; aged 29.

Benner, Irvin R., Belleair, Fla.; Ohio College of Dental Surgery, University of Cincinnati, 1898; died August 3; aged 84.

Blyth, Homer A., Drain, Ore.; died June 9; aged 71.

Blythe, James O., Evansville, Ind.; Indiana Dental College, Indianapolis, 1912; died June 29; aged 69.

Boggiano, Merle J., St. Louis; St. Louis University School of Dentistry, 1937; died June 30; aged 49.

Brown, Lee, Jr., Corpus Christi, Texas; Texas Dental College, Houston, 1926; died July 25; aged 53.

Bryans, Walter J., Lee, Mass.; Medico-Chirurgical College of Philadelphia, 1908; died August 13; aged 72.

Buell, Emmett H., Wichita Falls, Texas; Baylor University College of Dentistry, Dallas, 1938; died July 11; aged 52.

Burket, Ernest R., Fort Wayne, Ind.; Indiana Dental College, Indianapolis, 1899; died June 9; aged 82.

Burson, J. B., Birmingham, Ala.; Atlanta-Southern Dental College, Atlanta, 1913; died August 27; aged 67.

Byers, William L., Wakefield, Neb.; University of Nebraska, College of Dentistry, Lincoln, 1923; died July 28; aged 62.

Carden, James T., Cave City, Ky.; University of Tennessee College of Dentistry, Memphis, 1905; died March 4; aged 79.

Carver, Henry C., Wildwood, Fla.; Southern Dental College, Atlanta, Georgia, 1915; died July 30; aged 65.

Cavanagh, John F., Jackson Heights, N. Y.; University of Pennsylvania School of Dentistry, Philadelphia, 1933; died July 13; aged 47.

Cheney, Rollo H., McCracken, Kan.; Kansas City Dental College, 1916; died July 1957; aged 64.

Clendinin, Robert E., Martin, Tenn.; St. Louis University School of Dentistry, 1927; died August 2.

Conlon, John T., New Rochelle, N. Y.; died April 12; aged 82.

Dabrowski, Benjamin A., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1940; died April 1957, aged 47.

Davidson, Christian, Chicago; Northwestern University Dental School, 1915; died August 18; aged 63.

Davis, Clarence W., Cleveland; Western Reserve University School of Dentistry, Cleveland, 1897; died May 9; aged 82.

Davis, Fred R., Ranier, Ore.; North Pacific College of Oregon, School of Dentistry, Portland, 1906; died July 30; aged 79.

Davisson, Will D., Gurdon, Ark.; died June 25; aged 85.

Dean, Watson R., Brooklyn; College of Dental and Oral Surgery, New York, 1922; died August 6; aged 59.

Demos, Theodore J., Chicago, Illinois; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1945; died July 25; aged 35.

Detwiler, Daniel L., Herndon, Va.; Medical College of Virginia School of Dentistry, Richmond, 1922; died September 4; aged 60.

Doan, George R., Newtown, Pa.; Pennsylvania College of Dental Surgery, Philadelphia, 1899; died May 9; aged 78.

Doskow, Samuel, New York; University of Pennsylvania School of Dentistry, Philadelphia, 1901; died July 11; aged 77.

Duffy, Maurice J., New York; New York College of Dentistry, New York, 1913; died September 5; aged 68.

Dummit, Howard M., Arkansas City, Kan.; St. Louis University School of Dentistry, 1919; died July 1; aged 67.

Dunning, Lester B., Ghent, N. Y.; University of Pennsylvania School of Dentistry, Philadelphia, 1916; died June 24; aged 63.

Eagleson, William F., Concordia, Kan.; Cincinnati College of Dental Surgery, 1898; died June 1957; aged 83.

Edgell, F. P., Charles Town, W. Va.; Baltimore College of Dental Surgery, University of Maryland, 1905; died June 22; aged 74.

Errickson, William C., Freehold, N. J.; Temple University School of Dentistry, Philadelphia, 1922; died July 5; aged 57.

Falknor, Frank L., Versailles, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1904; died July 28; aged 77.

Farer, Charles H., Bronx, N. Y.; Columbia University School of Dental and Oral Surgery, New York, 1926; died September 2; aged 62.

Felt, Charles W., Salem, Mo.; Kansas City-Western Dental College, Kansas City, 1939; died July 7; aged 44.

Feyler, Howard C., Portsmouth, Ohio; Vanderbilt University School of Dentistry, Nashville, 1916; died July 19; aged 64.

Fleck, Clarence S., Johnstown, Pa.; Philadelphia Dental College, 1902; died July 4; aged 78.

Foster, Clarence D., Southampton, N. Y.; New York College of Dentistry, 1899; died April 3; aged 80.

Friedman, Harry H., Brooklyn; University of Pennsylvania School of Dentistry, Philadelphia, 1921; died August 2; aged 59.

Fuller, Charles C., Greenwood, S. C.; Atlanta Dental College, Atlanta, 1911; died June 28; aged 70.

Gants, Monte, Downs, Kan.; Kansas City Dental College, Kansas City, 1900; died July 17; aged 81.

Gates, Russell W., Paso Robles, Calif.; University of California College of Dentistry, San Francisco, 1937; died July 22; aged 45.

Gibbons, John J., New Bedford, Mass.; Tufts College Dental School, Boston, 1911; died June 18; aged 70.

Gilliland, Howard S., Aliquippa, Pa.; University of Pittsburgh School of Dentistry, 1924; died July 22; aged 66.

Gilman, Charles D., Ukiah, Calif; University of California College of Dentistry, San Francisco, 1896; died July 14; aged 81.

Gould, Raymond M., Philadelphia, Pa.; University of Pennsylvania School of Dentistry, Philadelphia, 1925; died May 11; aged 65.

Gray, Leonard, Newark, N. J.; College of Dental and Oral Surgery, New York, 1916; died July 16; aged 61.

Hagen, Stanley E., Washington, D. C.; Georgetown University School of Dentistry, Washington, D. C., 1944; died August 23; aged 42.

Hamman, Henry H., Rushville, Ill.; Northwestern University Dental School, 1905; died June 23; aged 76.

Harbison, Earl G., Minneapolis; University of Iowa College of Dentistry, Iowa City, 1918; died September 1; aged 65.

Harwood, Edwin M., Los Angeles; University of Southern California School of Dentistry, Los Angeles, 1901; died August 10; aged 86.

Havens, Alfred H., Millbrae, Calif.; University of California College of Dentistry, San Francisco, 1923; died July 22; aged 58.

Hewitt, Vinton L., Duluth, Minn.; Baltimore College of Dental Surgery, University of Maryland, 1908; died June 6; aged 81.

Hill, Luther D., Metairie, La.; Loyola University School of Dentistry, New Orleans, 1937; died July 3; aged 48.

Holden, Robert B., Miami; died July 13; aged 36.

Holmes, Frederick F., Providence, R. I.; Georgetown University School of Dentistry, Washington, D. C., 1924; died August 20; aged 61.

Horwitz, Arthur I., Chicago; Chicago College of Dental Surgery, 1919; died July 14; aged 63.

Hoxie, Charles R., Waterloo, Iowa; Northwestern University Dental School, 1902; died July 21; aged 77.

Jarvis, Thomas William, Logan, Utah; Chicago College of Dental Surgery, 1911; died July 31; aged 78.

Jeffers, John W., Lake Geneva, Wis.; Marquette University Dental School, Milwaukee, 1950; died July 2; aged 34.

Jesser, Jacob, Chicago; University of Illinois College of Dentistry, 1916; died August 25; aged 64.

Johnson, Luke, Lakewood, N. J.; University of Pennsylvania School of Dentistry, Philadelphia, 1923; died June 30; aged 56.

Jones, Elmer C., Cleveland; Hospital College of Medicine, Department of Dentistry of Central University, Richmond, Kentucky, 1897; died May 26; aged 83.

Kelly, Eugene J., Trenton, N. J.; University of Pennsylvania School of Dentistry, Philadelphia, 1928; died August 19; aged 53.

Kerr, Ernest E., Tacoma, Wash.; Chicago College of Dental Surgery, 1900; died June 21; aged 81.

Kimball, George G., Mitchell, S. D.; Northwestern University Dental School, 1907; died July 6; aged 71.

Knapp, Alvah H., Pittsfield, Mass.; died August 11.

Kohlsdorf, Edwin G., Burnside, La.; Milwaukee Medical College Dental Department, 1904; died July 8; aged 76.

Kolb, Arthur A., Orange Park, Fla.; St. Louis University School of Dentistry, 1913; died May 18; aged 72.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York
One Hundred and First Annual Session	Oct. 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	Oct. 16-19, 1961	Philadelphia

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 24-26, 1958	Montgomery	C. R. Crook	Professional Center, Montgomery
Alaska	June 3-6, 1958	Palmer	C. L. Polley	Box 1896, Juneau
Arizona	Apr. 16-19, 1958	Tucson	W. G. Burke	15 E. Monroe St., Phoenix
Arkansas	Apr. 13-16, 1958	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 20-23, 1958	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 14-16, 1958	Los Angeles	S. M. Silverman	903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 5-8, 1958	Colorado Springs	G. H. Jackson	724 Republic Bldg., Denver
Connecticut	May 14, 15, 1958	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			A. G. Schiek	3716 Philadelphia Pike, Claymont
District of Columbia	Mar. 9-12, 1958	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	May 18-21, 1958	Miami Beach	G. J. Perdigon	17 Davis Blvd., Tampa
Georgia	Oct. 12-15, 1958	Atlanta	J. W. Yarbrough	Southern United Bldg., Macon
Hawaii	June 15-19, 1958	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	June 16-18, 1958	McCall	G. L. Williamson	Sun Bldg., Boise
Illinois	May 11-14, 1958	Springfield	P. W. Clopper	632 Jefferson Bldg., Peoria
Indiana	May 19-21, 1958	Indianapolis	W. R. Shoemaker	Citizens Bank Bldg., Anderson
Iowa	May 5-7, 1958	Des Moines	H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas	May 5-8, 1958	Kansas City, Mo.	F. A. Richmond	Brotherhood Bldg., Kansas City 1
Kentucky	Mar. 23-26, 1958	Louisville	A. B. Coxwell, Jr.	2208 Dundee Rd., Louisville 5
Louisiana	Apr. 9-12, 1958	Monroe	J. S. Bernhard	2515 Line Ave., Shreveport
Maine			S. M. Gower	Box 27, Skowhegan
Maryland	May 4-7, 1958	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 4-7, 1958	Boston	H. E. Tingley	12 Bay State Rd., Boston 15
Michigan	Apr. 28-30, 1958	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 14-16, 1958	St. Paul	C. V. E. Cassel	2236 Marshall Ave., St. Paul 4
Mississippi	June 9-11, 1958	Biloxi	B. A. Cohen	500-E E. Woodrow Wilson Dr., Jackson 27
Missouri	May 4-8, 1958	Kansas City	E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana	May 1-3, 1958	Butte	R. C. Ritter	28 N. Black St., Bozeman
Nebraska	Apr. 28-30, 1958	Omaha	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	June 21-25, 1958	Lake Tahoe	O. M. Seifert	755 Ryland Ave., Reno
New Hampshire	June 22-24, 1958	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	May 18-21, 1958	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 25-28, 1958	Las Cruces	J. S. Eilar	7 Medical Arts Sq., N.E., Albuquerque
New York	May 12-14, 1958	Buffalo	C. A. Wilkie	1 Hanson Pl., Brooklyn 17
North Carolina	May 4-7, 1958	Pinehurst	L. H. Butler	Jefferson Bldg., Greensboro

State	Date	Place	Secretary	Address
North Dakota	May 4-7, 1958	Bismarck	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio			E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23, 1958	Oklahoma City	L. D. Wright	Osler Bldg., Oklahoma City
Oregon	Mar. 3-5, 1958	Portland	T. D. Holder	Selling Bldg., Portland
Panama Canal Zone	Apr. 1958	Ancon	W. R. Bond, Jr.	U.S.A., Ft. Kobbe Dental Clinic, Ft. Kobbe
Pennsylvania	May 21-23, 1958	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	January 1958		R. Borges	Box 843, Arecibo
Rhode Island	Jan. 28, 29, 1958	Providence	W. F. Decesare	216 Broadway, Providence
South Carolina	May 25-27, 1958	Myrtle Beach	J. E. Wallace	1506 Gregg St., Columbia
South Dakota	May 11-13, 1958	Mitchell	R. E. Decker	Box 308, Parker
Tennessee	May 12-15, 1958	Chattanooga	K. P. Ezell	116 N. Academy, Murfreesboro
Texas	May 3-6, 1959	San Antonio		3707 Gaston Ave., Dallas 10
Utah	May 22-24, 1958	Salt Lake City	R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont	May 25-27, 1958	Manchester	E. H. Van Santvoord	22 Washington St., Rutland
Virginia	May 4-7, 1958	Richmond	W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	Mar. 24-26, 1958	Seattle	W. P. Brust	Medical Center, Everett
West Virginia	July 20-23, 1958	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 21-23, 1958	Milwaukee	H. O. Hoppe	1331 W. Vliet St., Milwaukee
Wyoming	June 12-14, 1958	Casper	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 8-13* June 9, 10,† 1958	Birmingham	W. L. McCarty	Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas	June 16-20, 1958	Little Rock	W. T. Jones	107 E. Shelton, Monticello
California			D. R. Grant	507 Polk St., San Francisco
Colorado			R. F. Gilmore	Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia	Jan. 6-10, 1958	Washington	W. T. Birthright	1835 Eye St., N.W., Washington
Florida			R. P. Taylor, Jr.	P. O. Box 2913, Jacksonville 3
Georgia	June 9-11, 1958	Atlanta	W. G. Brown	Blackshear
Hawaii			J. Y. Ing	James Campbell Bldg., Honolulu
Idaho	June 23-25, 1958	Boise	A. G. DeWinter	Sun Bldg., Boise
Illinois			W. A. McKee	Wood Bldg., Benton
Indiana	Dec. 2-5*†	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	June 2-6, 1958*†	Iowa City	P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky	June 9-12, 1958*†	Louisville	J. J. Kelly	102 W. Madison St., Franklin
Louisiana			R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby	Box 260, Skowhegan
Maryland			W. D. Burton	829 Park Ave., Baltimore 1
Massachusetts			A. M. Bommer	349 Broadway, Revere
Michigan	Jan. 19-25 June 8-14, 1958	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit 21
Minnesota			M. G. Walls	Lowry Bldg., St. Paul
Mississippi	Jan. 6-8, 1958*†‡		A. H. Richter, Jr.	Aven Bldg., Greenwood

State	Date	Place	Secretary	Address
Missouri	June 9-11, 16, 17*	Kansas City	R. R. Rhoades	Central Trust Bldg., Jefferson City
	June 12-14, 16, 17*	St. Louis		
	Jan. 27-29,† 1958	Kansas City		
Montana			R. O. Betzuet	303 Power Block, Helena
Nebraska			H. E. Weber	Stuart Bldg., Lincoln
Nevada			A. A. Cozzalio	130 N. Virginia, Reno
New Hampshire	June 19, 20*	Boston	S. G. Markos	8 Renaud Ave., Dover
	June 19,† 1958			
New Jersey			C. J. Schweikhardt	150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr.	Artesia
New York	Dec. 10-13*‡		D. W. Beier	23 S. Pearl St., Albany 7
	February 3-5†‡			
	June 19, 24, 25†‡			
	June 19, 20, 24-27*‡			
	Dec. 2-5, 8, 9,*‡ 1958			
North Carolina			J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota	July 7-11, 1958	Fargo	G. F. Wirtz	Clinic Bldg., Mandan
Ohio			D. E. Bowers	322 E. State St., Columbus 15
Oklahoma			W. E. Cole	2420 N. Meridian, Oklahoma City
Oregon	Dec. 16-18*†	Portland	F. L. Utter	Pioneer Trust Bldg., Salem
Pennsylvania	Dec. 2-6*‡		R. E. V. Miller, Sr.	Dept. of Public Instruction, Box 911, Harrisburg
	Dec. 2-4†‡			
Puerto Rico			J. Mercado C.	Comercio St. #452, San Juan
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			W. J. Brockington	1508 Washington St., Columbia 1
South Dakota			H. T. Aker	Canton
Tennessee	Dec. 16-20‡		C. R. Aita	Bennie-Dillon Bldg., Nashville
Texas			R. T. Weber	Capital National Bank Bldg., Austin 16
Utah			A. Ridge, Jr.	10 S. Second E., Provo
Vermont	June 23-25, 1958*†	Burlington	P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington			F. S. Rotchford	1108 S. Washington St., Olympia
West Virginia	June 23-25, 1958	West Liberty	C. C. Cottrill	Box 111, Glen Rogers
Wisconsin			S. F. Donovan	Tomah
Wyoming			W. A. Hocker	O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Dentistry for the Handicapped	Feb. 2, 1958	Chicago	M. L. Bramer Secy.	3405 W. North Ave., Chicago
Academy of Denture Prosthetics	May 5-9, 1958	Detroit	W. L. Warburton Secy.	Medical Arts Bldg., Salt Lake City 11
All India Dental Conference (Thirteenth)	Feb. 1958	Poona	J. B. Jagos Org. Secy.	2, Mahatma Gandhi Rd., Poona 1, India
American Academy of Crown and Bridge Prosthodontics	Feb. 1-2, 1958	Chicago	C. E. Brooks Secy.	4500 Olive St., St. Louis 8
American Academy of Dental Medicine	Dec. 8	New York	G. J. Witkin Secy.	45 S. Broadway, Yonkers, N.Y.
American Academy of Dental Practice Administration	Jan. 30, 31, 1958	Chicago	R. H. Campbell Secy.	18595 Grand River, Detroit 23
American Academy of Maxillofacial Prosthetics	Jan. 30, 31, 1958	Chicago	H. C. Sullivan Secy.	1516 Wealthy St., S.E., Grand Rapids 6, Mich.
American Academy of Oral Pathology	Mar. 30, 31, 1958	Washington, D.C.	J. L. Bernier Secy.	Armed Forces Institute of Pathology, Washington 25, D.C.
American Academy of Restorative Dentistry	Feb. 1, 2, * 1958	Chicago	A. G. James Secy.	409 N. Camden Dr., Beverly Hills, Calif.

Name	Date	Place	Secy. or Chm.	Address
American Association for Cleft Palate Rehabilitation	Apr. 24-26, 1958	San Francisco	D. C. Spriestersbach Secy.	Dept. of Otolaryngology, University Hospitals, Iowa City
American Association of Dental Schools	Mar. 23-26, 1958	Detroit	M. W. McCrea Secy.	University of Minnesota, School of Dentistry, Minneapolis 14
American Association of Endodontists	Jan. 31-Feb. 2, 1958	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago 29
American Association of Industrial Dentists	Apr. 21-23, 1958	Atlantic City, N.J.	E. R. Aston Secy.	Pennsylvania Dept. of Health, P.O. Box 90, Harrisburg, Pa.
American Association of Orthodontists	Apr. 27-May 1, 1958	New York	E. E. Shepard Secy.	8230 Forsyth Blvd., St. Louis 24
American Board of Oral Pathology	Dec. 7, 8		D. A. Kerr Secy.	University of Michigan, School of Dentistry, Ann Arbor, Mich.
American Board of Oral Surgery	Dec. 2 Apr. 5-8, 1958	Chicago	L. M. FitzGerald Secy.	Roshek Bldg., Dubuque, Iowa
American Denture Society	Jan. 31, Feb. 1, 1958	Chicago	V. L. Steffel Secy.	College of Dentistry, Ohio State University, Columbus, Ohio
American Equilibration Society	Jan. 30, 1958	Chicago	W. W. Hurst Secy.	820 S. Damen Ave., Chicago 12
Asian Dental Congress (Second) and Asian-Pacific Dental Conference	Mar. 24-30, 1958	Manila, Philippines	B. B. Erana Pres. Elect	P. O. Box 373, Manila, Philippines
British Columbia Dental Association	May 1-3, 1958	Vancouver	I. U. MacIntosh Secy.	624 Sixth St., New Westminster, B.C., Canada
Chicago Dental Society	Feb. 2-5, 1958	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Cincinnati Dental Society	Mar. 23-25, 1958	Cincinnati	H. F. Lee Chm.	3180 Harrison Ave., Cincinnati 11
Cleveland Dental Society	Apr. 28-30, 1958	Cleveland	G. A. Blizil Exec. Secy.	1220 Huron Rd., Cleveland 15
Council on Dental Education, Dental Aptitude Tests	Jan. 10, 11 Apr. 25, 26, 1958		S. Peterson Secy.	222 E. Superior St., Chicago
Dallas Mid-Winter Dental Clinic	Jan. 26-29, 1958	Dallas	W. W. Sherrill Exec. Secy.	2609 Cedar Springs, Dallas, Texas
Denver Dental Association	Jan. 5-8, 1958	Denver	E. T. Klein Secy.	Republic Bldg., Denver 2
Greater New York Dental Meeting	Dec. 9-13	New York	I. Teich Secy.	Hotel Statler, New York 1
Greater Philadelphia Annual Meeting	Mar. 25-28, 1958	Philadelphia	M. Kohn Exec. Secy.	Sheraton Hotel, 17th St. and Pennsylvania Blvd., Philadelphia 3
International Association for Dental Research	Mar. 20-23, 1958	Detroit	D. Y. Burrill Secy.	129 E. Broadway Louisville 2, Ky.
Montana, Ninth District Dental Society	Jan. 16-18, 1958	Billings	C. H. Betzer Secy.	1231 N. 29th St., Billings, Mont.
National Board of Dental Examiners	Dec. 2, 3		G. J. Casey Secy.	222 E. Superior St., Chicago
Northwest Academy of Dental Medicine	Apr. 22-26, 1958	Victoria, B.C., Canada	G. Underwood Secy.	Selling Bldg., Portland, Ore.
Pan American Odontological Association	Dec. 11	New York	R. H. Brodsky Exec. Secy.	14 E. 81 St., New York
Southern Academy of Periodontology	Mar. 30-Apr. 1, 1958	New Orleans	J. R. Owings Secy.	7 Medical Court, Greenville, S.C.
Thomas P. Hinman Dental Clinic	Mar. 16-19, 1958	Atlanta, Ga.	H. Wallace Secy.	1415 The By Way, N.E., Atlanta, Ga.

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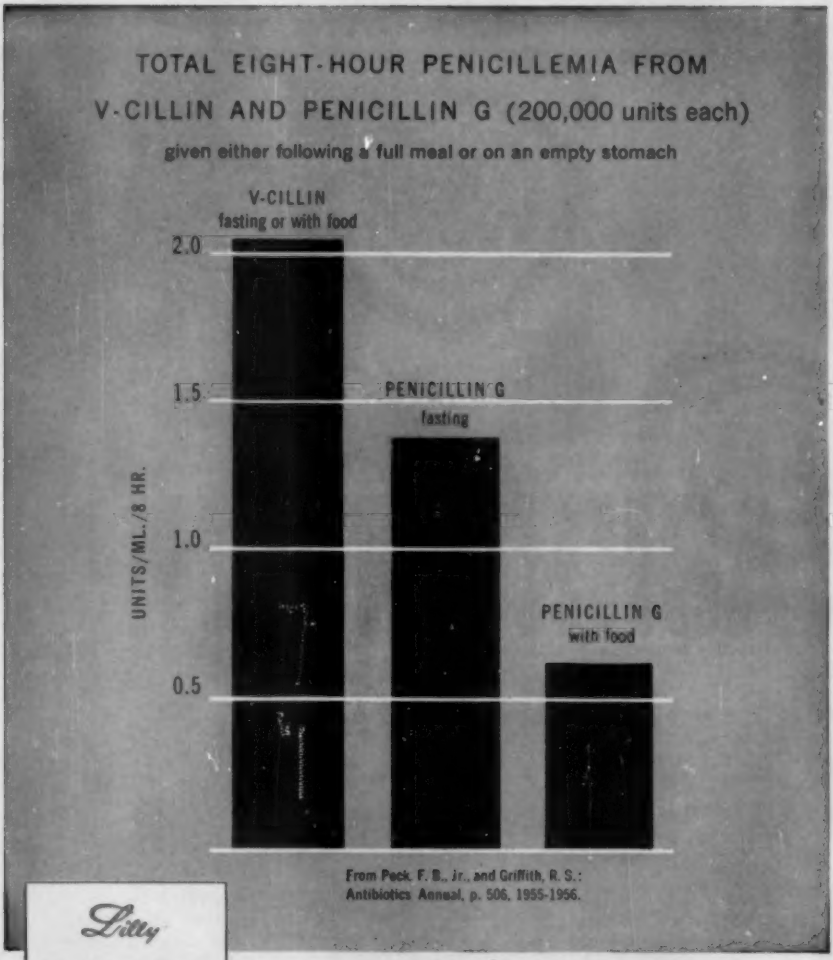

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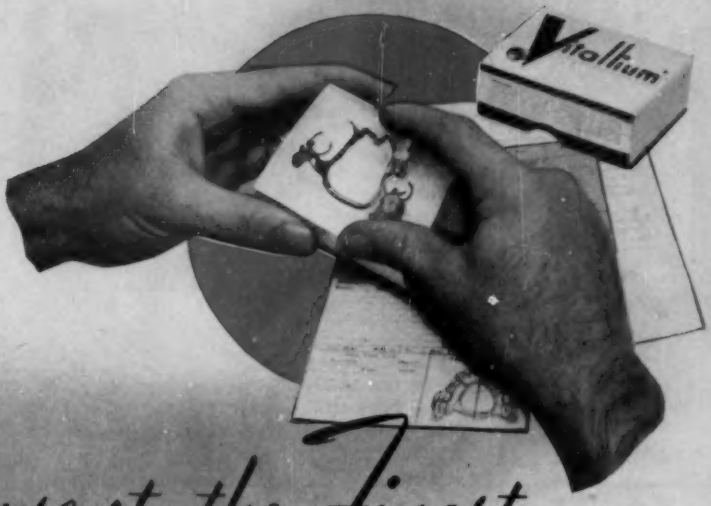

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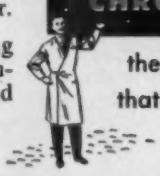

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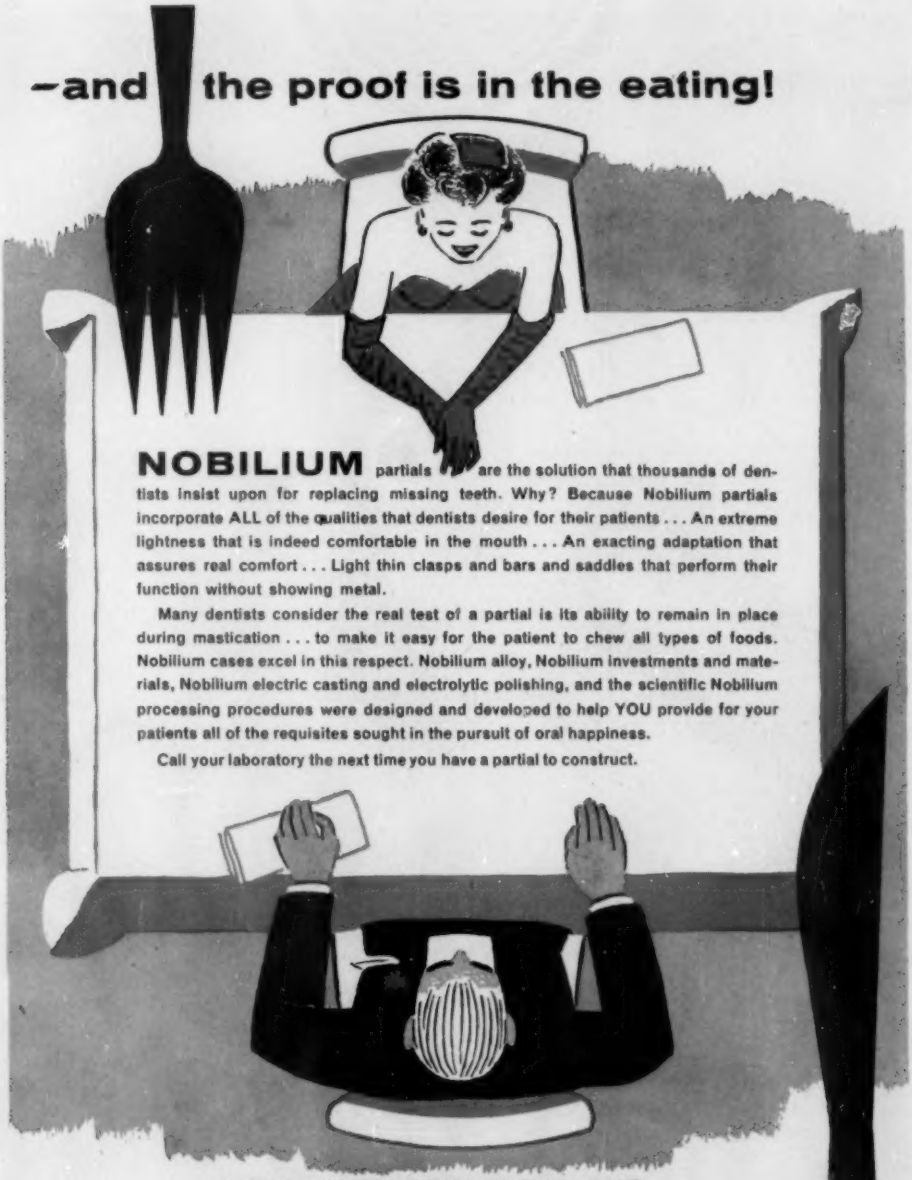

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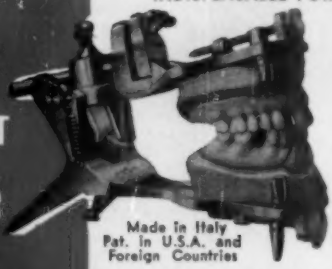

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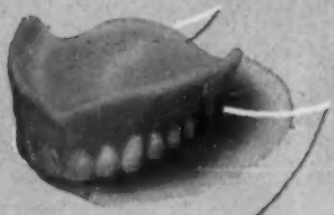

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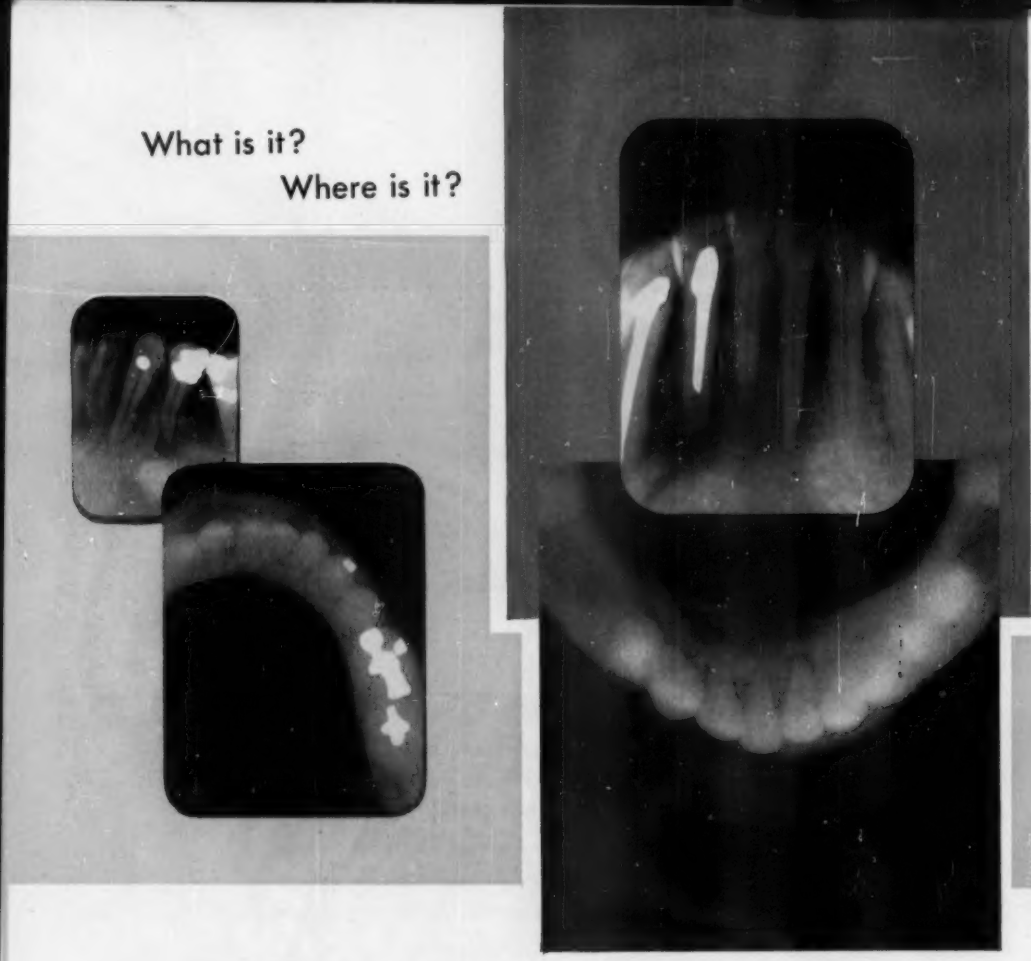

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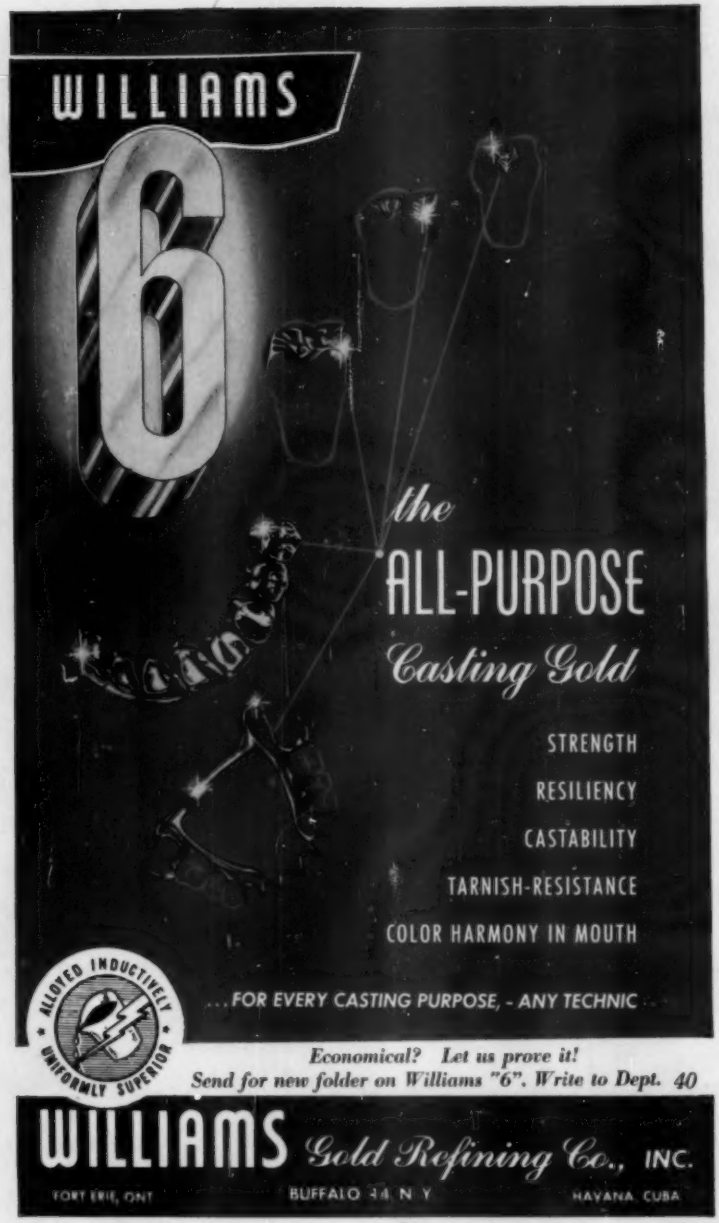

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No question but that Lionel Barrymore was one-of-a-kind. Yet the qualities so richly combined in him exist in a large measure among all the 170 million of us who call ourselves Americans.

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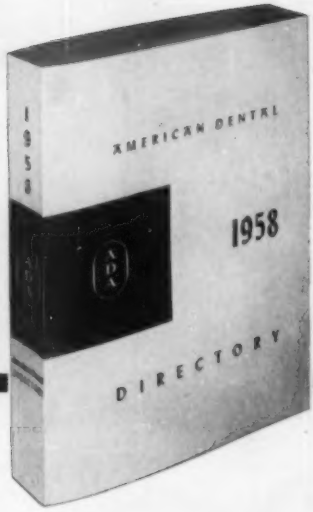

. . . because it lists the names and addresses of over 100,000 dentists both alphabetically and geographically. With complete and up-to-date information on each dentist listed including ADA membership status, age, character of practice, dental school attended, and year of graduation the referral of patients becomes a simple matter. Whatever the locality in the 48 states, territories or possessions, the *American Dental Directory* can supply the desired information about dentists—general practitioners and specialists—quickly and accurately.

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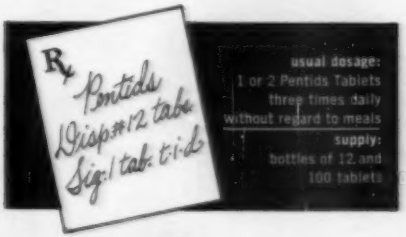

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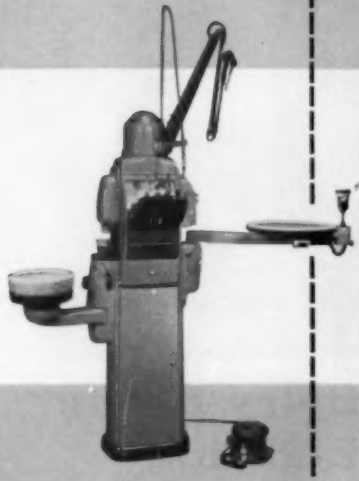

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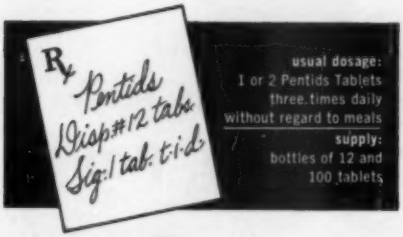

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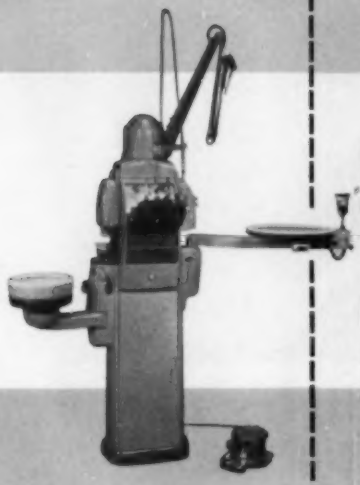

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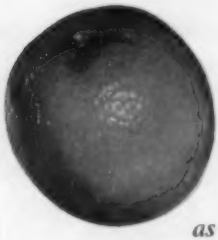

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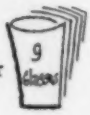
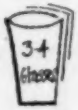
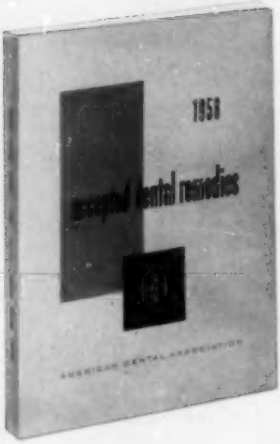
Vitamin C recommendations for peak intakes of adolescence or pregnancy (100 mg. per day)* are supplied by (7-9 fl. oz.) of citrus juice. But it takes of apple juice, or  of grape juice, or  of pineapple juice, or of prune juice to supply this amount of vitamin C.†

* During lactation Recommended Daily Allowance for vitamin C is 150 mg.; for normal adults, 70-75 mg.

Florida Citrus Commission, *Lakeland, Florida*

† Data calculated from: Watt, B. K. et al., U. S. Dept. Agric. Handbook No. 8, 1950; and Burger, M. et al., Agr. & Food Chem. 4:418, 1956.



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56th ANNUAL MEETING

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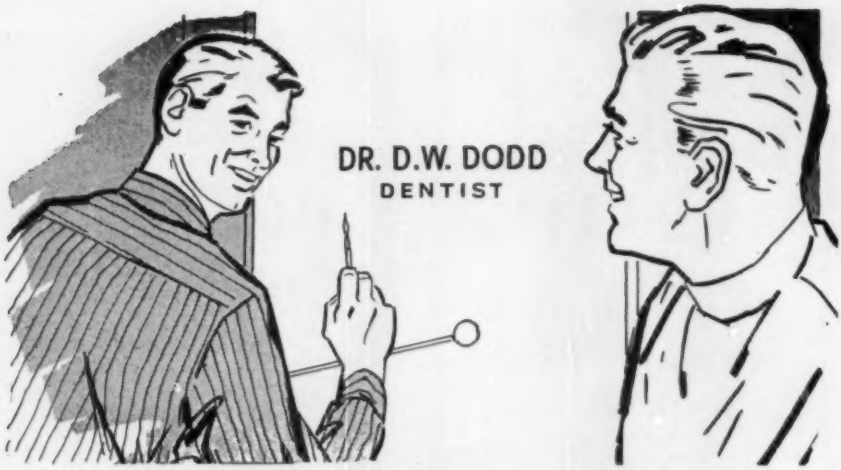

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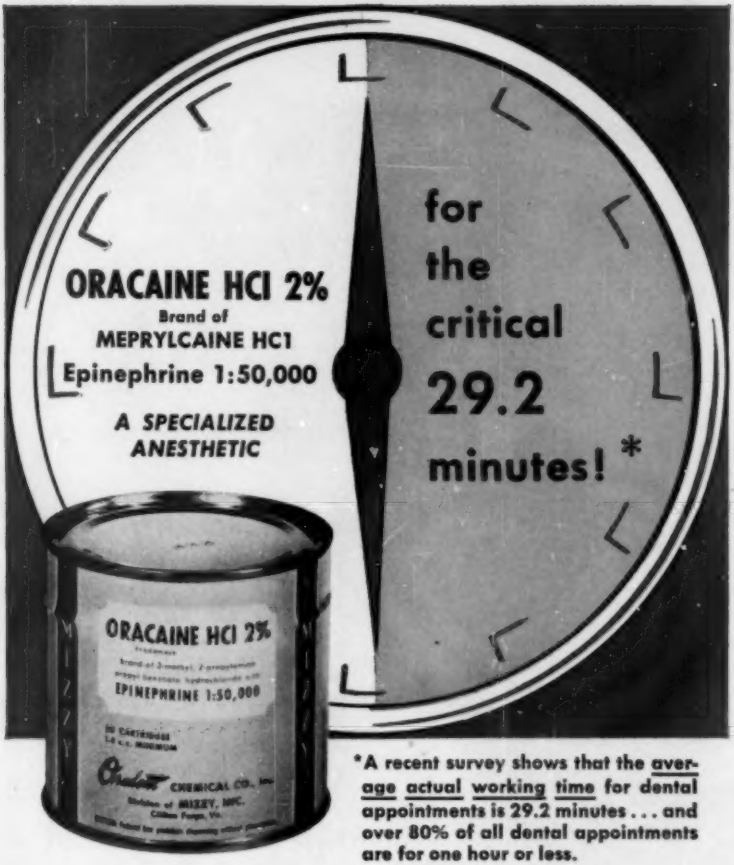

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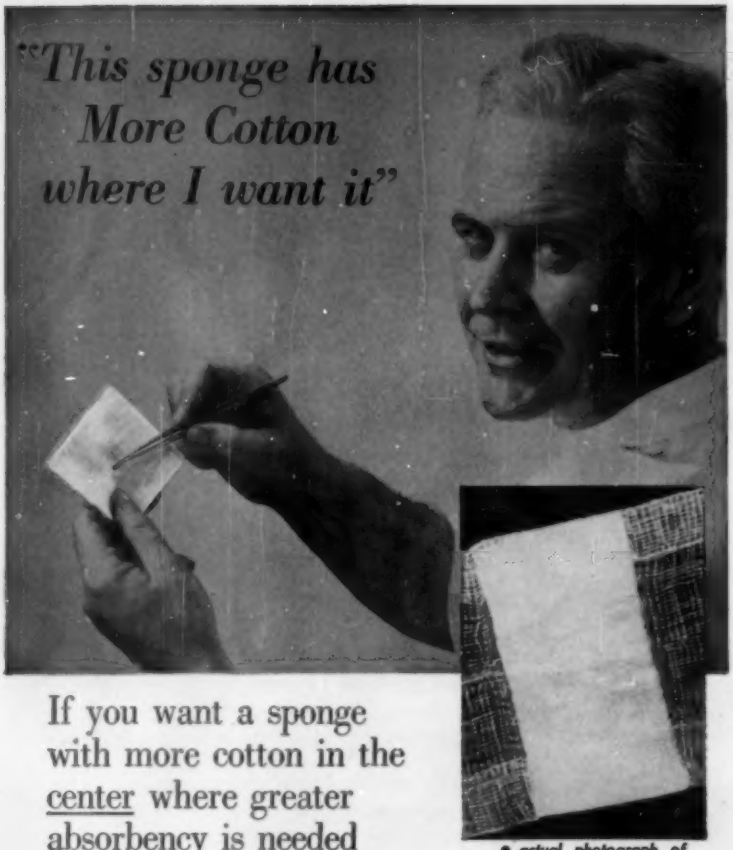

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For the dentist
who wants to please...

What is a Sensible Breakfast?

The division of his day into periods for productive work, for play, and for sleep makes man fare best when his total daily food intake is distributed over three sensibly organized meals.

Since a high percentage of adolescents and adults forego or skimp breakfast, it is well to point out the need for a sensible breakfast: a meal which provides energy for a morning of productive work, which allays hunger until the noon meal, which supplies an adequate share of the day's nutrient requirements, and which consists of inviting, easily digested foods.

A dish of oatmeal helps fulfill the requirements of such a breakfast: It provides readily available energy; it helps to allay hunger throughout the morning; it makes a notable contribution to the day's nutritional needs; it fits into virtually every breakfast, including most of those especially low in calories.*

Oatmeal is richer in protein than other whole-grain breakfast cereals. None are as high in thiamine as oatmeal. Also, oatmeal provides other B-complex vitamins. Its mineral content, especially of iron and phosphorus, rates it among the leaders.

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Quaker Oats and Mother's Oats, the two brands of oatmeal offered by The Quaker Oats Company, are identical. Both brands are available in the Quick (cooks in one minute) and the Old-Fashioned varieties which are of equal nutrient value.

DENTAL AUTHORITIES stress the importance of optimal nutrition in the aim toward better dental health during the early growth years. Oatmeal, with its wealth of essential nutrients, not only contributes broadly to good nutrition, but—since its carbohydrate is not readily degraded to simple fermentable sugars—is of virtually no cariogenic influence.

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1400 CALORIES OR LESS PER DAY	2400 CALORIES PER DAY	3000 CALORIES OR MORE PER DAY
Breakfast	**Breakfast**	**Breakfast**
Approximately 300 Calories	**Approximately 500 Calories**	**Approximately 700 Calories**
Orange juice, 4 oz.	Orange juice, 4 oz.	Orange juice, 4 oz.
Oatmeal, 1 oz. Skim milk, 4 oz.	Oatmeal, 1 oz. Milk, 4 oz.	Oatmeal, 1 oz. Milk, 4 oz.
Toast, 1 slice lightly buttered	One egg	Two eggs
†Coffee without cream or sugar	Toast, 2 slices with butter or jelly	Bacon, 2 strips
	†Coffee	Toast, 2 slices with butter or jelly
†For children substitute 4 oz. skim milk		†Coffee

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Plus A New High in Patient Tolerance

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San Francisco 3, California

School of Dentistry
University of California
University Medical Center
San Francisco 22, California

School of Dentistry
University of Southern California
925 West Thirty-fourth Street
Los Angeles 7, California

School of Dentistry
College of Medical Evangelists
Loma Linda, California

DIST. OF COLUMBIA
School of Dentistry
Georgetown University
3900 Reservoir Road, N.W.

Washington 7, D. C.
College of Dentistry
Howard University
600 W. Street, N. W.
Washington 1, D. C.

GEORGIA
School of Dentistry
Atlanta-Southern Dental College
Emory University
106 Forrest Avenue, N.E.
Atlanta 3, Georgia

ILLINOIS
Chicago College of Dental Surgery
Loyola University
1757 West Harrison Street
Chicago 12, Illinois

The Dental School
Northwestern University
311 East Chicago Avenue
Chicago 11, Illinois

College of Dentistry
University of Illinois
808 South Wood Street
Chicago 12, Illinois

INDIANA
School of Dentistry
Indiana University
1121 West Michigan Street
Indianapolis 2, Indiana

IOWA
College of Dentistry
State University of Iowa
Dental Building
Iowa City, Iowa

KENTUCKY
School of Dentistry
University of Louisville
129 East Broadway
Louisville 2, Kentucky

LOUISIANA
School of Dentistry
Loyola University
6363 St. Charles Avenue
New Orleans 18, Louisiana

MARYLAND
Baltimore College of Dental Surgery
The Dental School
University of Maryland
618 West Lombard Street
Baltimore 1, Maryland

MASSACHUSETTS
Harvard School of Dental Medicine
25 Shattuck Street
Boston 15, Massachusetts

School of Dental Medicine
Tufts University
136 Harrison Avenue
Boston 11, Massachusetts

MICHIGAN
School of Dentistry
University of Detroit
630 East Jefferson Avenue
Detroit 26, Michigan

School of Dentistry
University of Michigan
Ann Arbor, Michigan

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School of Dentistry
University of Minnesota
Washington Ave. and Union St., S.E.
Minneapolis 14, Minnesota

MISSOURI
Kansas City-Western Dental College
1108 East Tenth Street
School of Dentistry
The University of Kansas City
Kansas City 6, Missouri

School of Dentistry
St. Louis University
3556 Carolina Street
St. Louis 4, Missouri

School of Dentistry
Washington University
4559 Scott Avenue
St. Louis 10, Missouri

NEBRASKA
School of Dentistry
The Creighton University
26th and California Streets
Omaha 2, Nebraska

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University of Nebraska
Lincoln 8, Nebraska

NEW JERSEY
School of Dentistry
Farleigh Dickinson University
Teaneck, New Jersey

College of Dentistry
Seton Hall University
Jersey City Medical Center
Jersey City, New Jersey

NEW YORK
School of Dental and Oral Surgery
Columbia University
630 West 168th Street
New York 32, New York

College of Dentistry
New York University
209 East Twenty-third Street
New York 10, New York

School of Dentistry
University of Buffalo
3435 Main Street
Buffalo 14, New York

NORTH CAROLINA
School of Dentistry
The University of North Carolina
Chapel Hill, North Carolina

OHIO
College of Dentistry
The Ohio State University
Columbus 10, Ohio

School of Dentistry
Western Reserve University
2165 Adelbert Road
Cleveland 6, Ohio

OREGON
The Dental School
University of Oregon
611 S.W. Campus Dr., Sam Jackson Park
Portland 1, Oregon

PENNSYLVANIA
School of Dentistry
Temple University
3223 North Broad Street
Philadelphia 40, Pennsylvania

Thomas W. Evans Museum & Dental
Institute School of Dentistry
University of Pennsylvania
4001 Spruce Street
Philadelphia 4, Pennsylvania

School of Dentistry
University of Pittsburgh
Thackeray and O'Hara Streets
Pittsburgh 13, Pennsylvania

TENNESSEE
School of Dentistry
Meharry Medical College
Nashville 8, Tennessee

College of Dentistry
University of Tennessee
847 Monroe Avenue
Memphis 3, Tennessee

TEXAS
College of Dentistry
Baylor University
800 Hall Street
Dallas 10, Texas

The University of Texas
Dental Branch
6516 John Freeman Ave.
Houston 25, Texas

VIRGINIA
School of Dentistry
Medical College of Virginia
12th and Clay Streets
Richmond 19, Virginia

WASHINGTON
School of Dentistry
University of Washington
Health Sciences Building
Seattle 5, Washington

WEST VIRGINIA
School of Dentistry
West Virginia University
Morgantown, West Virginia

WISCONSIN
School of Dentistry
Marquette University
604 North Sixteenth Street
Milwaukee 3, Wisconsin

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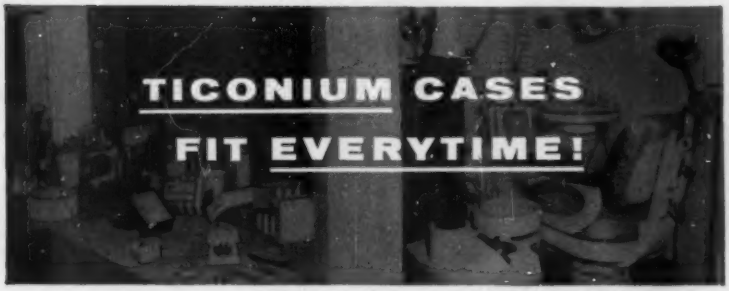

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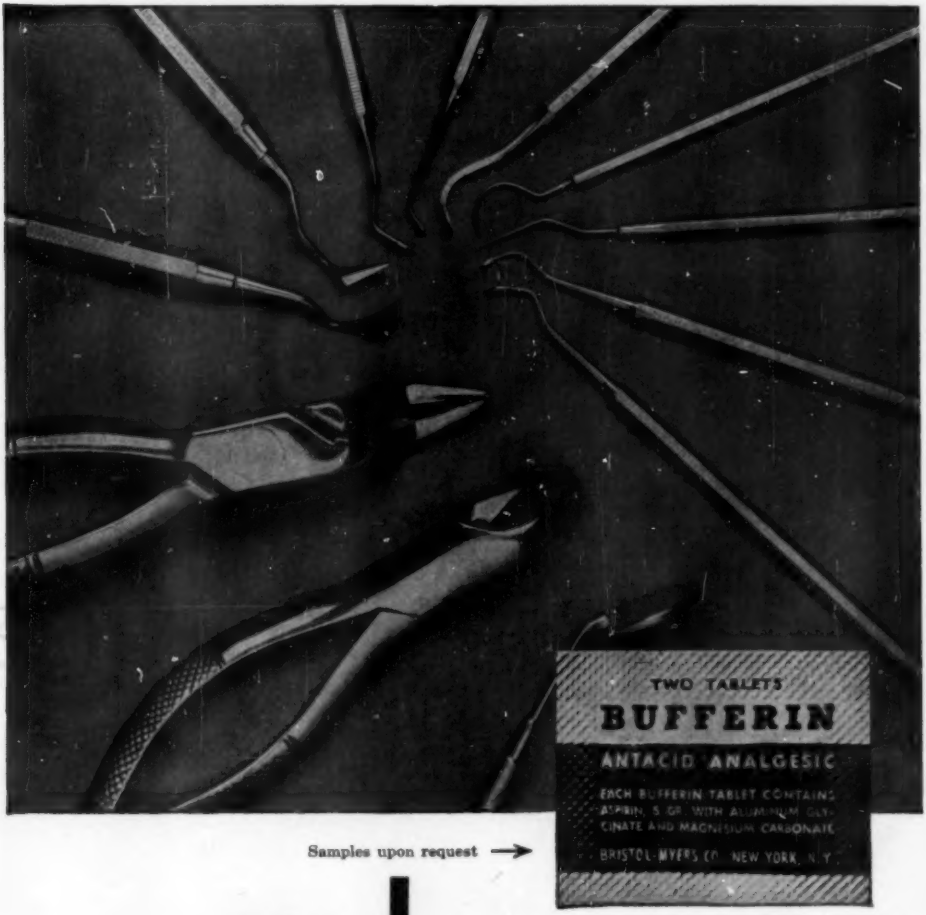

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